Section 107 Navigation Improvement Study
Feasibility Report and Environmental Assessment
Finding of No Significant Impact and
Section 404(b)(1) Evaluation for
Improvement and Maintenance Dredging

Bucks Harbor
Machiasport, Maine

Draft

US Army Corps
of Engineers®
New England District

June 2008

Executive Summary

This Feasibility Report for navigation improvements at Bucks Harbor, in Machiasport, Maine, was prepared under the continuing authority of Section 107 of the River and Harbor Act of 1960, as amended. The report consists of a main report summarizing the existing conditions of the project area, problem identification, plan formulation, cost benefit analysis, an Environmental Assessment, and appended supporting documentation for Pertinent Correspondence, Engineering Design, Geologic Assessment, and Economic Analysis. The study, conducted at a cost of $330,000 and cost-shared with the town of Machiasport, accomplished the following:

- Examined existing conditions and assessed the extent of problems with harbor navigation and related opportunities for water resource development and environmental enhancement.
- Developed and evaluated alternative improvements.
- Assessed the environmental impacts of alternative improvements.
- Evaluated the economic benefits of alternative improvements and conducted a cost-benefit analysis and incremental optimization.
- Determined the Federal interest in participating in improvements.
- Identified the capability and willingness of the non-Federal Sponsor, the town of Machiasport to share the cost of implementing the project.

Bucks Harbor is located in the town of Machiasport, Maine on the west coast of Machias Bay. The harbor lies 70 miles east of Ellsworth, Maine and about 25 miles west of Lubec, Maine and the Canadian border. The Harbor encompasses an inner and outer harbor. The commercial fleet open moors in the outer harbor. There is an existing Federal project, completed in 1974, that provides for 11 acres of anchorage area 8 feet deep at mean low water (MLW) and about 2 acres of maneuvering area also at 8 feet MLW. This project was intended to service the commercial fishing fleet.

Local officials and harbor users expressed one principal concern with restrictions on navigation at Bucks Harbor, namely the lack of adequate public anchorage to efficiently accommodate a commercial fishing fleet that has grown significantly since the design of the existing project more than 30 years ago. Expanding the anchorage area and providing a designated channel to connect the town wharf and other launch points located near the inner harbor with the harbor entrance will eliminate harbor congestion, groundings in shallow harbor areas, collisions, and other inefficiencies that constrain commercial operations.

Plans for dredging expanded public anchorage for the commercial fishing fleet were examined. The recommended plan, Alternative 3E, will provide an additional 23.1 acres, comprising 6’ and 8’ deep anchorage, will provide the commercial fleet with sufficient mooring space. The large extent of sensitive mud flats and ledge surrounding the available deep water limits the area available for any expansion of dredged features.

A designated fairway for commercial boaters can best be accomplished by providing an 80-foot wide by 1,600-foot long channel along the southern side of the harbor. Also provided at the terminus of the channel is a one acre turning basin.

The total first cost of implementing the recommended plan, based on October 2007 price levels, is estimated at $1,179,000. The cost is based on the mechanical dredging of about 53,700 cubic yards of mixed material. Disposal of the material will be at the Machias Bay Disposal Site located a couple of miles from the harbor. Annual costs, including the cost of maintenance dredging, are estimated at $85,200. Average annual benefits to commercial navigation are estimated at $192,300, resulting in a benefit-cost ratio of 2.26 and net annual benefits of $107,100.

The Non-Federal cost share for the proposed project would equal ten percent of the first cost of construction, or $117,900. $5,600 is due at the beginning of Plans & Specifications and the remainder, $112,300, is due prior to solicitation of the construction contract. A second ten percent non-Federal share would be payable upon completion of the project either lump-sum, or with interest over a period of up to 30 years at the Sponsor's election. The Sponsor, the town of Machiasport, has indicated its willingness and capability to provide the required non-Federal cost-sharing and other items of non-Federal cooperation as specified in the Draft Project Cooperation Agreement.

Based on this analysis, the District Commander recommends modification of the existing Federal navigation project at Bucks Harbor, Maine, under the continuing authority of Section 107 of the River and Harbor Act of 1960, as amended.

Summary Project Implementation Information
Section 107 Navigation Improvement Project
Bucks Harbor, Machiasport, Maine

Bucks Harbor Navigation Improvement – Project Costs and Justification

Dredging Quantity	53,700 cy	I&A Rate 4-7/8%	0.05372
Boulder Removal	90 cy	Project Life	50 Years
Mobilization/Demobilization	$142,800	Interest & Amort.	$63,300
* Mechanical Dredging ($16.22/cy)	870,500	Annual O&M	$21,900
Boulder Removal ($450.00/cy)	40,500	Total Ann Cost	$85,200
Subtotal	$1,053,800	Annual Benefits	$192,300
Engineering and Design	60,000	Net Benefits	$107,100
Supervision and Administration	65,000	B/C Ratio	2.26
Total First Cost	$1,178,800		

* Contingency of 20% included in unit price.

Bucks Harbor – Project Cost Sharing Apportionment

	Total Cost	Federal Cost	Sponsor Cost
Plans and Specifications Phase	$56,000		
Up-Front Cost		$50,400	$5,600
Construction Phase	$1,123,000		
Up-Front Cost		$1,010,700	$112,300
Remainder Cost-Share		-$117,900	$117,900
Total (Post-Feasibility)	$1,179,000	$943,200	$235,800
Feasibility Study (previously funded)	$330,000	$215,000	$115,000
Total Expenditure	$1,509,000	$1,158,200	$350,800

NAVIGATION IMPROVEMENT PROJECT
FEASIBILITY REPORT
BUCKS HARBOR, MACHIASPORT, MAINE

Table of Contents

Appendices

List of Figures

List of Tables

FEASIBILITY REPORT
SECTION 107 NAVIGATION IMPROVEMENT STUDY
BUCKS HARBOR, MACHIASPORT, MAINE

INTRODUCTION

This report is the result of engineering, economic, and environmental feasibility studies of navigation improvements in Bucks Harbor, Machiasport, Maine.

Bucks Harbor is located in the town of Machiasport, Maine on the west coast of Machias Bay (see Figure 1). The harbor lies 70 miles east of Ellsworth, Maine and is situated along U.S. Route 1, about 25 miles west of Lubec, Maine and the Canadian border. The Harbor encompasses an inner and outer harbor. The inner harbor is primarily intertidal and is used as a clam harvesting resource. This area is also used to moor vessels during severe storm conditions, tide permitting. The commercial fleet open moors in the outer harbor. The harbor is bordered by mainland to the south and west, and by mudflats, mainland and Bar Island to the north. Access to Machias Bay is from the east. There is an existing Federal project, completed in 1974, that provides for 11 acres of anchorage area 8 feet deep at mean low water (MLW) and about 2 acres of maneuvering area also at 8 feet MLW. This project was intended to service the commercial fishing fleet.

The harbor supports a mixed fleet of small craft, including a large commercial fishing fleet, several charter fishing boats and some seasonal recreation craft. The former fisherman's coop pier has been bought and rebuilt by Atlantic Salmon of Maine. The company is a major employer in the area and operates several salmon pens in Machias Bay. There are also a large number of larger inshore draggers that harvest scallops, mussels, quahogs, and sea urchins. Inadequate depths in areas outside of the developed Federal anchorage area limit the capacity of the harbor. The growth in the commercial fishing fleet since completion of the existing project in 1974 has outstripped harbor capacity.

Study Authority

This Feasibility Report for navigation improvement at Bucks Harbor, in Machiasport, Maine, was prepared under the continuing authority of Section 107 of the River and Harbor Act of 1960, as amended. The study cost was $330,000 of which the non-Federal sponsor, the town of Machiasport, provided $165,000. The town of Machiasport assisted in the study by providing information on harbor use and economic impact.


Larrabee
Holmes Pt
Heath
Indian Head
Indian Head
Indian Cove
Larrabee Cove
Bucks Mtn
Miller Mtn
Mountain Head
Bird Island
Yellow Head
Bucks Harbor
Bucks Neck
Bar Island
BUCKS HARBOR
Mt Aetna
Mt Aetna
Bucks Head
Howard Mtn
Howard Cove
Seashore Mtn
Howard Point
Howard Point
Jasper Head
Seashore Ledge
LOCATION MAP
0 50 100 200
Miles
BUCKS HARBOR
ATLANTIC OCEAN
FIGURE 1
BUCKS HARBOR
MACHIASPORT, MAINE
PROJECT LOCATION
0 1,000 2,000 4,000
Feet

Study Purpose and Scope

The purpose of this study is to determine whether Federal involvement in potential solutions to commercial navigation problems at Bucks Harbor is warranted. The scope of this Feasibility Report provides for the following:

- Identifying existing conditions and historical trends within the study area,
- Determining the commercial navigation problems and needs of the area,
- Determining the most probable future condition without Federal improvements,
- Developing alternative improvement plans,
- Evaluating and comparing the engineering, economic, environmental, and social impacts of the alternative plans, with respect to the future condition,
- Recommending commercial navigation improvements that are implementable, economically feasible, environmentally and financially acceptable, and socially beneficial.

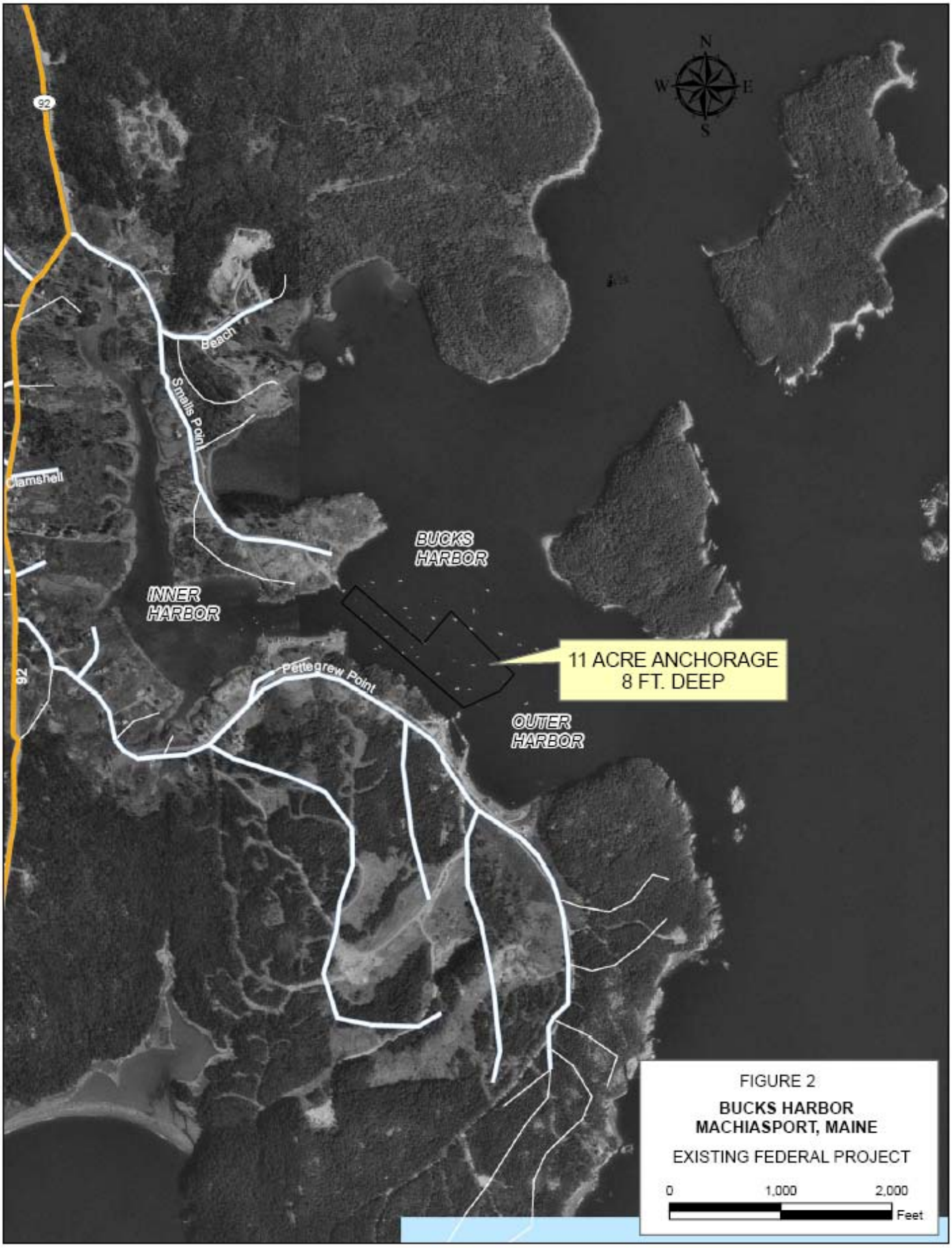
The report consists of this main report summarizing the existing conditions of the project area, problem identification, plan formulation, cost benefit analysis; an Environmental Assessment and related documents; and appended supporting documentation for engineering design, a geologic assessment, an economic analysis, and real estate requirements.

Prior Studies and Improvements

Federal: The feasibility of providing a Federal navigation improvement project in Bucks Harbor was first studied in 1967. Prior to this, there had been no improvement projects by either Federal, state, or local interests. A study, under the authority of Section 107 of the River and Harbor Act of 1960, as amended, examined the justification and acceptability of providing navigation improvements to relieve the commercial fishing fleet of excessive storm damages, tidal delays and damages. Submitted in 1971, and adopted in November 1972, the Corps of Engineer's study recommended construction of a navigation project. The recommended plan and eventual project which followed is shown on Figure 2. It provides for an 11acre anchorage dredged to 8 feet deep below MLW, in what is known as the outer harbor. The constructed project consists of 13 acres allowing for an open fairway for transiting the anchorage. Disposal of the dredged material was at an open water site located approximately 2 miles southeast of Bucks Harbor. The project was completed in July 1974 at a cost of $277,000. As this project was solely for commercial interests and based on cost sharing policies of the time, construction costs were 100 percent Federal.

In 1977, the town of Machiasport requested that the Corps study the feasibility of providing modifications to the existing project. Problems noted were waves breaking in the vicinity of moored boats which caused damages and shoreline erosion. This was reported to be caused by a radical change in bottom contours where the Federal project limits and the natural bottom meet. Two alternatives were developed to rectify the situation however neither was economically justified.

The town of Machiasport requested Federal assistance in investigating and solving the problem of navigation space in the harbor by letter on March 5, 1987. A 1988 Reconnaissance Study of the project resulted in a recommendation to investigate the feasibility of expanding the existing project. However, at that time, the town was unable to


N
W
E
S
92
Beach
Smalls Point
Clamshell
BUCKS HARBOR
INNER HARBOR
11 ACRE ANCHORAGE
8 FT. DEEP
Pettegrew Point
OUTER HARBOR
92
FIGURE 2
BUCKS HARBOR
MACHIASPORT, MAINE
EXISTING FEDERAL PROJECT
0
1,000
2,000
Feet

provide the required 50% study cost-share. No further action was taken. In May 2002 the town requested maintenance dredging of the existing project and expansion of the anchorage. An initial appraisal was completed in 2003 that recommended a feasibility study, which subsequently began when a cost sharing agreement was executed February 6, 2004.

Non-Federal: In 1986 the town of Machiasport, with funding received from the state of Maine, engaged the services of an engineering consulting firm to assist in developing a harbor management plan including onshore services, vessel mooring and storm protection. The report presented plans for onshore improvements related to commercial fishing interests, and anchorage and breakwater designs.

In November 1988 the town received a Coastal Zone Management (CZM) grant to study waterfront planning. This included shoreline ordinances and zoning, identification, improvement and/or construction of possible public access points in the harbor for a new public pier and boat ramp.

PROBLEM IDENTIFICATION

Existing Conditions

Bucks Harbor is the town of Machiasport's only harbor, although several small rocky coves along Machias Bay are also used as anchorages and landings by small boats, as weather allows. The town of Machiasport had a year round 2006 population of 1,123 representing a 3 percent decrease over the previous sixteen years.

The project site has a mean tidal range of 12.5 feet and a spring tidal range of 14.4 feet. Depths in the harbor gradually deepen from about 5 feet at the town landing to 30 feet at the entrance to Machias Bay.

Land-Use and Navigation Facilities

The northern and western reaches of the inner harbor contain extensive tidal flats, and there are no shore facilities in this area. The lower half of the outer harbor is the site of the existing Federal navigation project consisting of a total of 11 acres of anchorage with a depth of 8 feet at mlw. A sizable year round commercial fishing fleet of 65 vessels (plus another 29 commercial floats, lobster cars, and working barges) is based in the harbor as well as a seasonal recreational fleet of about 40 vessels.

The land around the harbor is basically residential with a variety of commercial concerns located in the southern and western portions of the area. Commercial fishing is an important part of the local economy, lobstering being particularly popular. Bucks Harbor is a mainly "working" harbor, as opposed to a tourist port.

There are three primary public access facilities in Bucks Harbor. The first is the newly improved town pier located on the south side of the harbor at about the midpoint along the waterfront. The pier is fully equipped with utilities (e.g. electricity, water, pump-out facilities) and a crane that is used for offloading and repairs of commercial vessels. The second public access facility is the launch ramp area at Finn Beach located in the inner harbor. Fishermen use the concrete planks laid across the flats to drive their trucks and trailers out to the water and launch their tenders. Catch and supplies are moved through this area. A similar but smaller site for accessing the harbor can be found at the third public facility at Pettegrow's Beach, which is located on the east side of the outer harbor.

There are two major commercial fish facilities located in Bucks Harbor. The first is the Atlantic Salmon Company whose operations are focused on the large pier located at the west end of the outer harbor on Bucks Neck. This company, which is based in Belfast, Maine, has revenues that are in the tens of millions per year and over half (> 100 people) of its workforce is based in Machiasport. The Bucks Harbor division is used to tend (feed and harvest salmon, and repair) salmon pens in the area. BBS Lobster Company has facilities on the southeast side of the harbor including a pier, crane, parking, and lobster pound. They purchase and sell lobsters and crab. They also sell fuel, supplies, and bait.

There are five other commercial operations that utilize the harbor worth noting: Machias Bay Boat Tours and Sea Kayaking, Machias Bay Seafood, Superior Shellfish, Doug Wood Oyster Farming, and Dana Urguhart. In addition to lobster and crab, the seafood companies market clams, urchins, and oysters. Mr. Urguhart has a pier on the south side of the harbor. His company provides ferry service for cargo in the Machias Bay area and general maritime construction.

Existing Fleet

The commercial fishing operations based at Bucks Harbor are in a prime location, offering quick access to the fishing grounds amongst the nearby islands in Machias Bay as well as the Gulf of Maine. The commercial fleet consists of about 65 year round vessels and several sizeable floats, lobster cars, and working barges. Sixty percent of these vessels are lobster boats. The remaining boats are scallop draggers and vessels servicing the salmon farming, oyster, urchin, crabbing fishing industry. There are several transient lobster, scallop and crab boats that operate out of Bucks Harbor seasonally. Much of the fleet continues to fish during the winter months as the vessels experience minimal ice damage during a typical winter season.

Bucks Harbor is also home to a small recreational fleet. In 2007, the recreational fleet in the harbor numbered over 40 vessels and is comprised of small powerboats, day sailors, and sailboats. The recreational boating season lasts approximately 17 weeks, or 120 days, between early-June and late September, with reduced activity in late May and early October that stretches the season.

Harbor Sediments and Dredge Material

Sediments from the Bucks Harbor site are predominately find grained consisting of mostly clay and silt. See the attached Environmental Assessment (EA) for more detail. Sand and coarse materials were a minor component of the sediment composition. Appendix A of the EA contains graphical representations of the grain size distributions in the project area.

Sediments were collect for chemical analysis by the Woods Hole Group on April 28, 2004. Twelve samples were collected and a total of four composite samples were created. All composites were found to contain very low levels of the contaminants of concern that were tested for. The material is not located near known significant sources of contaminants.

Disposal options for the dredged material from this project included upland, in-water beneficial habitat, beach fill, and open water disposal. One potential upland disposal site was identified for this project. The site identified was on private land approximately 8 miles from Bucks Harbor. The use of the identified upland site would require the material to be dredged, dewatered (for which there is no readily available site adjacent to Bucks Harbor), loaded on to trucks and then placed at the site. This additional handling of the material makes it a prohibitively expensive option and was dropped from further consideration. The mudflats and shallow waters of the harbor and surrounding bays and coves support soft-shelled clams and eelgrass beds that appear to be very productive. Disposal in one of these areas would present severe environmental constraints. Beach nourishment does not appear to be a viable alternative because of the lack of nearby beaches and the fine fine-grained nature of the material. Open water disposal is the remaining practical option for disposal.

Problems with Navigation

There is one basic navigation problem encountered at the Bucks Harbor: a lack of adequate anchorage space. Since the design and construction of the existing Federal project in the early 1970's, the commercial fleet has grown substantially. Benefits computed for the existing project in the 1971 Feasibility Report were based on 40 lobster boats and 4 draggers. According to a list provided by the Harbormaster, today's commercial fleet at Bucks Harbor is comprised of some 65 commercial fishing boats plus another 29 floats, lobster cars, and working barges necessary for fishing operations. The present commercial fishing fleet represents an increase of more than twice the design fleet of 1971. In addition, the size (both draft and length) of the vessels has generally increased. There were ten vessels on the Harbormaster's list with lengths greater than 40 feet and five with drafts greater than 6.5 feet.

During the summer boating season, the harbor becomes overcrowded and the available anchorage is more congested. Boats are forced to crowd their moorings together or use the old fairway for anchoring. Moored boats swing about in response to wind, waves, and currents and chafe together resulting in damage to equipment and hulls. Secondly, boats attempting to navigate through the harbor to the open waters of Machias Bay must travel at slow speeds and exercise extreme caution. Many collisions occur with boats underway striking each other, floating lobster cages, and moored boats. Also, extensive congestion delays occur as boats navigate around each other in their attempt to leave or enter the harbor. Grounding damage also occurs as boats moor or are forced to maneuver in shallower portions of the harbor.

With this type of overcrowding, the original fairway has lost its effectiveness and a new channel through the outer harbor as well as a turning basin needs to be established. Provision of a channel or fairway to access the town pier, Finns Beach and the other businesses surrounding the harbor will alleviate this problem.

Environmental Resources

Bucks Harbor contains intertidal flats, mainly in the northern and western sections of the inner harbor. These mudflats support dense assemblage of benthic invertebrates. Mudflats provide year-round forage area for a variety of waterfowl, seabird, and other aquatic bird species.

A community profile in the areas of proposed improvements was undertaken as part of this study. It is apparent that the community is dominated by a typical assemblage of opportunistic and transitional stage benthic species. Polychaetes and Oligochaetes were the dominant taxonomic groups. A summary of the benthic data, including station locations, is presented in Appendix D of the EA.

Threatened and Endangered Species

Coordination with the U.S Fish and Wildlife Service and National Marine Fisheries Service indicates that nesting bald eagles and Atlantic salmon are present in the project area. Harbor seals may also be present in the project area as well.

Essential Fish Habitat

According to NMFS documents, sixteen (16) federally managed species have EFH designations within the area that encompasses Bucks Harbor and Machias Bay. These 16 species include: Atlantic salmon, Atlantic cod, pollock, whiting, red hake, white hake, winter flounder, yellowtail flounder, windowpane flounder, American plaice, ocean pout, Atlantic halibut, Atlantic sea scallop, Atlantic sea herring, Atlantic mackerel, and bluefin tuna.

Socio-Economic Resources

The social character of most communities along the Maine coast has always revolved around commercial fishing. This has been altered over the past several decades by the growth in the tourism and seasonal home industry. However, commercial fishing and other supporting maritime businesses continue to be the economic driver for the economy of Machiasport. The town has no other large businesses that directly impact the economy as much as commercial fishing.

Historic and Archaeological Resources

There is evidence of Pre-Contact use of the area. On the east side of the port, local residents have located shell middens, projectile points, and other artifacts (Dana Urquahart: Personal Communication).

Europeans settled Machiasport, Maine in 1765. The area was important for its lumber and sawmills during the 18th and 19th centuries. Ships loaded the timber at wharves lining the banks of the Machias River in Machiasport. Several structures from this period survive, notably the Gates House, which is now the Machiasport Historical Society (Ruth Page: Personal Communication). When the timber in the area was exhausted, the residents turned to fishing for their major source of income.

Fort Machias, now known as Fort O'Brien, was an active fort from 1783 to 1812 when it was taken over by the British. The breastworks still remain, overlooking Machias Bay.

There are ten known shipwrecks near Machiasport, including one in the mudflats north of the existing project area. However, none of these known wrecks or any other known historic or archaeological resources are within the impact area of the proposed navigation improvement project in Bucks Harbor.

Without Project Condition (Condition if No Federal Action is Taken)

If no federal action is taken to improve the navigation condition at Bucks Harbor, the present conditions and current trends will continue. Without improvements, the operating efficiency of the commercial and recreational fleets will continue to be impaired. The size of the commercial fleet and influx of recreational boats during the summer season will continue to force a situation of overcrowding in the available harbor space. Vessels moored close together will continue to experience damages as they swing about on their lines. Vessels underway in the harbor will continue to experience congestion delays and damages as they move amongst closely moored vessels as well as other moving boats.

For those craft now forced by overcrowding to moor in shallow waters outside of the dredged anchorage area, groundings while at mooring or while underway transiting to deeper waters would continue. Groundings cause damage to hulls, propellers, shafts, rudders, engine intakes and through-hull electronics and other gear. Attempts to avoid grounding will result in tidal delays, scheduling delays and increases in operational costs. For the fishing fleet these conditions will result in costs for repairing grounding damage, lost days of operation for repairs, and increased operational costs while awaiting safe transit conditions.

The local commercial fleet fish near shore waters in and around Machias Bay. The primary catch is lobster, with oysters, urchins and crabs supplementing total shellfish landings. Salmon farming is also a vital industry to Bucks Harbor. The harbor is one of the primary bases for the Atlantic Salmon Company. Several salmon farming pens are located just outside the harbor in Machias Bay. The species harvested are not over-harvested or otherwise imperiled and landings, particularly of lobster, are expected to remain stable. Under the present conditions, it is apparent that the harbor will continue to experience these navigation problems, thereby hindering the local fishing industry's efficiency.

Planning Constraints and Objectives

Planning constraints are parameters that limit the implementation of any proposed plan of improvement and serve to eliminate from consideration all those possibilities that offer no acceptable degree of satisfaction. These constraints can include natural conditions, economic factors, social and environmental considerations and legal and policy restrictions. In the case of Bucks Harbor improvements there were no major constraints identified that would inhibit the planning process.

The Federal objective of water and related land resources project planning is to contribute to national economic development consistent with protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. Beginning in 2003, Federal civil works planning must also examine

the potential to incorporate environmental enhancement opportunities in water resources planning, consistent with the focus on the baseline project purpose and the financial limitations of the project Sponsor.

a. Water and related land resources project plans shall be formulated to alleviate problems and take advantage of opportunities in ways that contribute to these objectives.

b. Contributions to national economic development (NED) are increases in the net value of the national output of goods and services, expressed in monetary units. Contributions to NED are the direct net benefits that accrue in the planning area and the rest of the Nation. Contributions to NED include increases in the net value of those goods and services that are marketed, and also to those that may not be marketed.

c. Opportunities for enhancement of the environment involve taking advantage of potential synergies between the planning, construction and operations & maintenance aspects of the Federal Navigation Project and opportunities for preservation and enhancement of natural resources and the environment.

Several planning objectives were identified which specifically address the navigation problems and needs of Bucks Harbor. These objectives would:

- Reduce the cost of commercial fishing operations for the Bucks Harbor fleet during 2007-2057 period of analysis
- Contribute to safer conditions for the commercial fleet in Bucks Harbor during 2007-2057 period of analysis
- Reduce projected without-project congestion delays for commercial navigation in Bucks Harbor during the 2007-2057 period of analysis
- Identify synergistic opportunities for environmental enhancement and protection at Bucks Harbor in conjunction with the goals for navigation purposes during the 2007-2057 period of analysis

State and local objectives for the project area include the continued development, management and success of Bucks Harbor as a base for commercial fishing. The town of Machiasport's continued efforts to expand and improve municipal landing and pier facilities in support of commercial fishing activity in Bucks Harbor indicates their commitment to these objectives.

PLAN FORMULATION

The consideration of the problems and needs within the study area led to the formulation of alternative plans. These plans are developed and designed to achieve the planning objectives previously identified. Sponsor objectives are important considerations in the evaluation of alternative plans.

Plan Formulation Rationale

The formulation of plans for navigation improvements at Bucks Harbor are based on a standard set of criteria. Alternative plans must be complete in that they provide and account for all necessary investments or other actions to ensure the realization of the planned effects. Alternative plans must be effective so as to alleviate the specified problems and achieve the

desired goals. Alternative plans must be efficient, demonstrating a cost effective means of alleviating the specified problems and realizing the specified opportunities. Alternative plans must also be acceptable to state and local entities and the public and be compatible with existing laws, regulations, and public policies.

Each alternative is considered on the basis of its effective contribution to the planning objectives. Selection of a specific plan is based on technical, economic, and environmental criteria, which permit the fair and objective appraisal of the impacts and feasibility of alternative solutions.

Technical criteria require that the optimum plan have the dimensions necessary to accommodate the expected user vessels and sufficient area to provide for maneuvering of boats and development or continued use of shore facilities. All plans must contribute to navigation efficiency and be complete within themselves, in that all actions and costs necessary to achieve supporting benefits are included in the plan.

Economic criteria require that the tangible benefits of the navigation improvement exceed the economic costs and that the scope of the project is such as to provide maximum net economic benefits. Consistent with policy on priority outputs for civil works projects, consideration is focused on project features that benefit commercial navigation, including fishing, shellfishing, passenger carriage, and cargo transport. Recreational benefits resulting from project improvements incidental to the commercial purpose may be used to support project justification provided they do not exceed 50 percent of total project benefits. Project features and separable increments of project features that have a recreational purpose, or that require greater than 50 percent recreational benefits for justification, are of low priority, and may not be recommended for implementation.

Environmental criteria require that the selected plan incorporate measures to preserve and protect the environmental quality of the project area. This includes (1) identification of impacts to the natural and social resources of the area and the minimization of those impacts that adversely affect the surrounding environment, (2) assessment of impacts that are incurred during the construction of the proposed navigation improvements and those activities attracted to the area after the plan implementation, and (3) assessment of opportunities to enhance the environment consistent with the baseline project purpose.

Management Measures

A range of management measures can be identified and evaluated as the basis for formulating alternative plans to solve the navigation problems in Bucks Harbor. These management measures are categorized as either structural or non-structural.

Structural measures are identified as those that involve the construction of features that would, to varying degrees, meet the planning objectives developed for Bucks Harbor. These alternatives would include providing additional anchorage, a navigation channel, and/or a protective breakwater. Non-structural measures involve those solutions, which would achieve the same objectives, but would do so without resorting to structural improvements. An example of a non-structural measure would be the transfer of vessels to the neighboring ports with sufficient excess capacity to accommodate the additional commercial vessels.

Other measures include adjusting project plans to take advantage of potential synergies for incorporation of environmental features or outputs in project plans. The desired result is a balance between the economic and environmental outputs of the project.

Development of Alternative Solutions to Navigation Problems

A number of navigation improvement alternatives were developed and analyzed during the early stages of the planning study. These alternatives included the possibility of transferring a portion of the existing fleet to other areas or harbors and various dredging options.

Non-Structural Alternative

One non-structural alternative considered was having vessels moor further and further east in the outer harbor where there are naturally deeper depths. By moving more vessels further east, some of the congestion in the harbor could be alleviated. However, moving east leaves vessels more open to the direct exposure of wind and wave attack. Even in the warmer months, vessels moored there, and their gear, sustain greater wear and damage than those moored in the confines of the existing anchorage. Further, boats relocated to the east will need to purchase and maintain heavier mooring gear than they now use. Further, vessels moored further east will be located further away from access to existing shore facilities.

Transfer of a portion of the commercial fleet to nearby Jonesport Harbor, was also found impractical. Though Jonesport could be theoretically expanded to accommodate the Bucks Harbor vessels, this would add 2 hours to the work day or $636,000 in additional labor and fuel costs for the fishermen to harvest their catch. Combined with the cost of expanding Jonesport Harbor, it was determined that this alternative was not economically viable and dropped from further analysis.

Structural Alternatives

With a lack of justification to transfer boats out of the harbor, it became apparent that improving navigation conditions for the commercial fleet would require actions that provide for the safe and efficient operation of these vessels at Bucks Harbor itself. Discussions with local officials and fishermen revealed that modification of the existing Federal project, by providing additional anchorage space, would be the desired structural approach. For actual plans to be formulated, a survey of the existing fleet and the adequacy of the existing navigation facilities was needed. The town provided data and surveys of the commercial fleet and fishermen and specifics on harbor operation.

Anchorage Improvements

Areas to the far west and north of the existing anchorage were considered for location of the additional anchorage. However, these areas were found to have very shallow depths, potential ledge and significant intertidal habitat that would increase the costs and environmental impacts of the project. These areas were eliminated from further consideration.

Consideration was given to creating an anchorage to the east of the existing project in deeper water. However, as was previously discussed, the area is far more exposed to damaging wind and waves. Adding breakwaters to the outer harbor entrance would make this area

more feasible for anchorage expansion. This alternative was given further consideration during the analysis.

The most logical area for anchorage expansion was adjacent (north) to the existing project. Subsurface investigations (see Appendix B) in this area indicate that ledge is absent, and sediment testing indicates the material is suitable for unconfined open-water disposal. This area was selected for detailed examination.

Other Improvements

Whereas the existing project provided for a fairway area for boats to access the shore side facilities, over time and as the need for anchorage space increased, the designated fairway area was lost. The formulation process during this study recognized that a designated navigation channel needed to be included in the alternative plans. Provision of a dedicated channel in the harbor will provide unobstructed access to the public and private landings and improve the overall efficiency of the commercial fleet. Several layouts of this channel were proposed including through the middle of the outer harbor and south along the harbor's shore.

A designated turning basin was also seen as necessary to accommodate the maneuvering of vessels in the area of Finn's Beach and the Atlantic Salmon Company's pier.

Design Vessels

The existing commercial fleet at Bucks Harbor consists of about 65 year round commercial fishing boats, of which the majority is lobster boats. In addition to this there are 29 floats, lobster cars, and working barges used by the salmon farming industry. The total of all commercial vessels in the harbor is 94 and this was the fleet size used for determining the amount of anchorage space needed. The 40 or so seasonal recreation vessels were not included in the calculations for anchorage space or benefits.

The commercial vessels at Bucks Harbor average about 35 feet in length and have a 4.5-foot loaded draft. An analysis of the survey data determined that the vessels generally fall into two categories. The 30 foot long class (includes all vessels 34 feet long and less) includes 44 vessels that have a draft of 3.5 feet. The 40 foot long class (includes all vessels 35 feet long and greater) includes 50 vessels that have a draft of 5.5 feet. Further information on the design vessels used in this analysis can be found in Appendix A.

Anchorage Design

The existing project provides for 11.0 acres of 8 foot deep anchorage. The required anchorage area and necessary depths for safe navigation were determined using the average lengths, drafts, and mooring line lengths of the existing fleet that would use the harbor, assuming single point moorings. See Appendix A for details on the anchorage area calculations. The needs of the existing fleet relative to the area available for anchorage in the inner harbor are shown below in Table 1.

TABLE 1
BUCKS HARBOR ANCHORAGE NEEDS

	# of Boats	Anchorage Needed (Acres)
30 Foot Class	44	13.5
40 Foot Class	50	20.6
Total Requirement	94	34.1
Existing Anchorage Provided		11.0
Additional Commercial Anchorage Needed		23.1

Due to the mixed-use nature of the harbor, the current open-moored recreational fleet will be accommodated in the existing project areas along with the commercial fleet, as at present. However, new anchorage was only designed to accommodate the needs of the commercial fleet in accordance with Corps regulations and national priorities for new civil works development. No new recreational space can be provided.

Channel Design

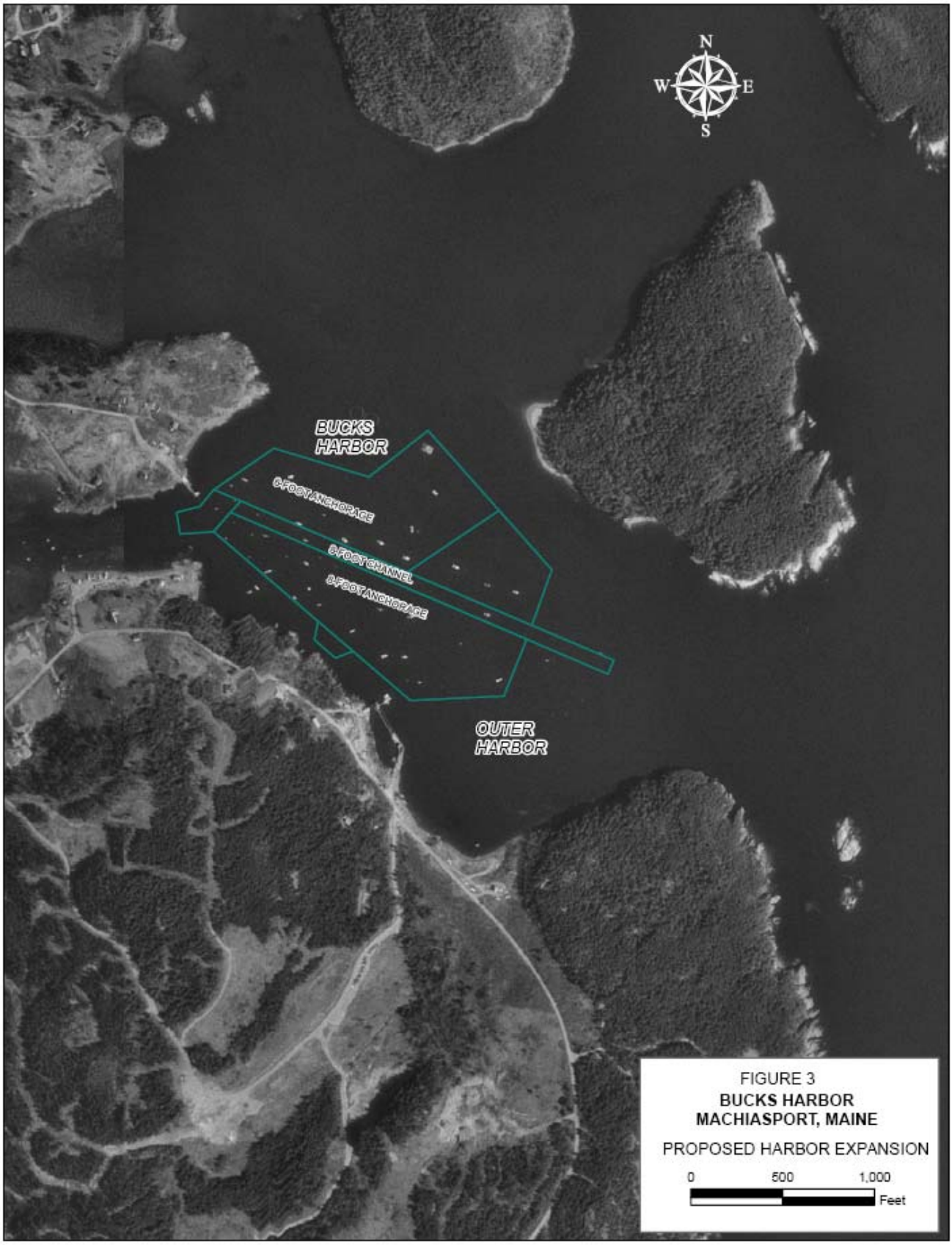
Channel and anchorage design must be focused on the requirements of the commercial fleet so that any benefit to the recreational fleet remains incidental to commercial navigation project purpose. The outer harbor is exposed only to southeasterly seas and that across the limited fetch between the harbor entrance and the group of islands to the east. Wave heights and swells in the existing anchorage area do not generally exceed a foot or two. The maximum draft of the fishing fleet is about 5.5 feet with 7.0 feet as the maximum for other lesser-volume barge traffic. With allowances for vessel motion while underway, an underkeel clearance of about 2.5 feet would be sufficient for these craft in the outer harbor. The existing 8-foot depth is therefore sufficient for the channel depth to access the outer harbor.

The volume of traffic in the harbor necessitates two-way traffic. Channel design width must account for vessel size, the presence of cross winds and currents, clearance between passing vessels and adjacent banks, facilities and moored vessels. Excluding the infrequent barge traffic, the larger classes of boats in the Bucks Harbor fleet have a beam of about 13 to 14 feet. Allowing for adequate maneuvering lane width, safe vessel separation and clearance between the channel and adjacent anchorage areas, a channel width of about 80 feet for two-way small craft traffic would be sufficient in these protected waters. This channel could be located either right down the center of the harbor, with anchorage on either side, or along the southern shoreline.

COMPARISON OF DETAILED PLANS

Description of Detailed Plans

Seven alternative plans of improvement were developed for further evaluation (1 and 2 are the “no action” and “fleet relocation” alternatives, respectively). The first five alternatives (3a thru 3e) involve expanding the existing project by the amounts described above but at different depths. Each plan differs in benefits and the cost of construction. The general layout of alternatives 3a thru 3e can be seen in Figures 3 and 4.


N
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E
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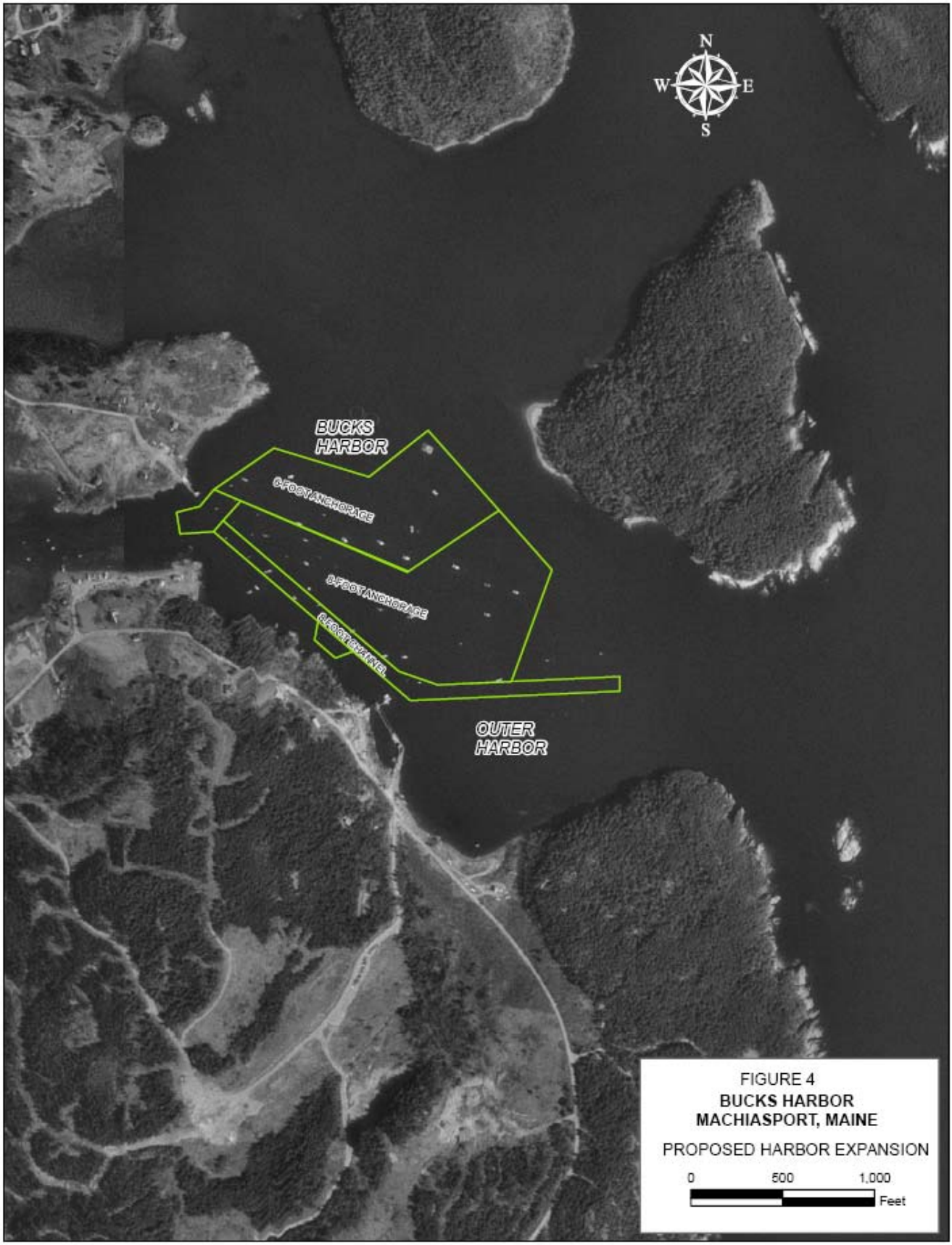
BUCKS HARBOR
8-FOOT ANCHORAGE
8-FOOT CHANNEL
8-FOOT ANCHORAGE
OUTER HARBOR
FIGURE 3
BUCKS HARBOR
MACHIASPORT, MAINE
PROPOSED HARBOR EXPANSION
0
500
1,000
Feet


N
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BUCKS HARBOR
6-FOOT ANCHORAGE
8-FOOT ANCHORAGE
6-FOOT CHANNEL
OUTER HARBOR
FIGURE 4
BUCKS HARBOR
MACHIASPORT, MAINE
PROPOSED HARBOR EXPANSION
0
500
1,000
Feet

Alternative 3a Involves creating an additional 13.5 acres of 6' anchorage, 2.1 acres of 8' channel, and 9.6 acres of 8' anchorage in the harbor.

Alternative 3b Involves creating an additional 23.1 acres of 6-foot anchorage and 2.1 acres of 6-foot channel.

Alternative 3c Involves creating an additional 23.1 acres of 8-foot anchorage and 2.1 acres of 8-foot channel.

Alternative 3d Involves creating an additional 23.1 acres of 10-foot anchorage and 2.1 acres of 10-foot channel.

Alternative 3e This sub-alternative is similar to 3a but in this case the channel is routed along the south side of the harbor rather than through the middle.

The addition of a breakwater(s) was also considered in order to alleviate overcrowding conditions in the harbor. The general layout of Alternative 4a and 4b can be seen in Figures 5 and 6. The creation of a breakwater would add additional anchorage space in the form of deep water moorings to the project area. Sub-alternatives 3a-3e were considered in conjunction with the following breakwater alternatives.

Alternative 4a Involves the creation of a 415' breakwater to the south and a 575' breakwater to the north (Bar Island).

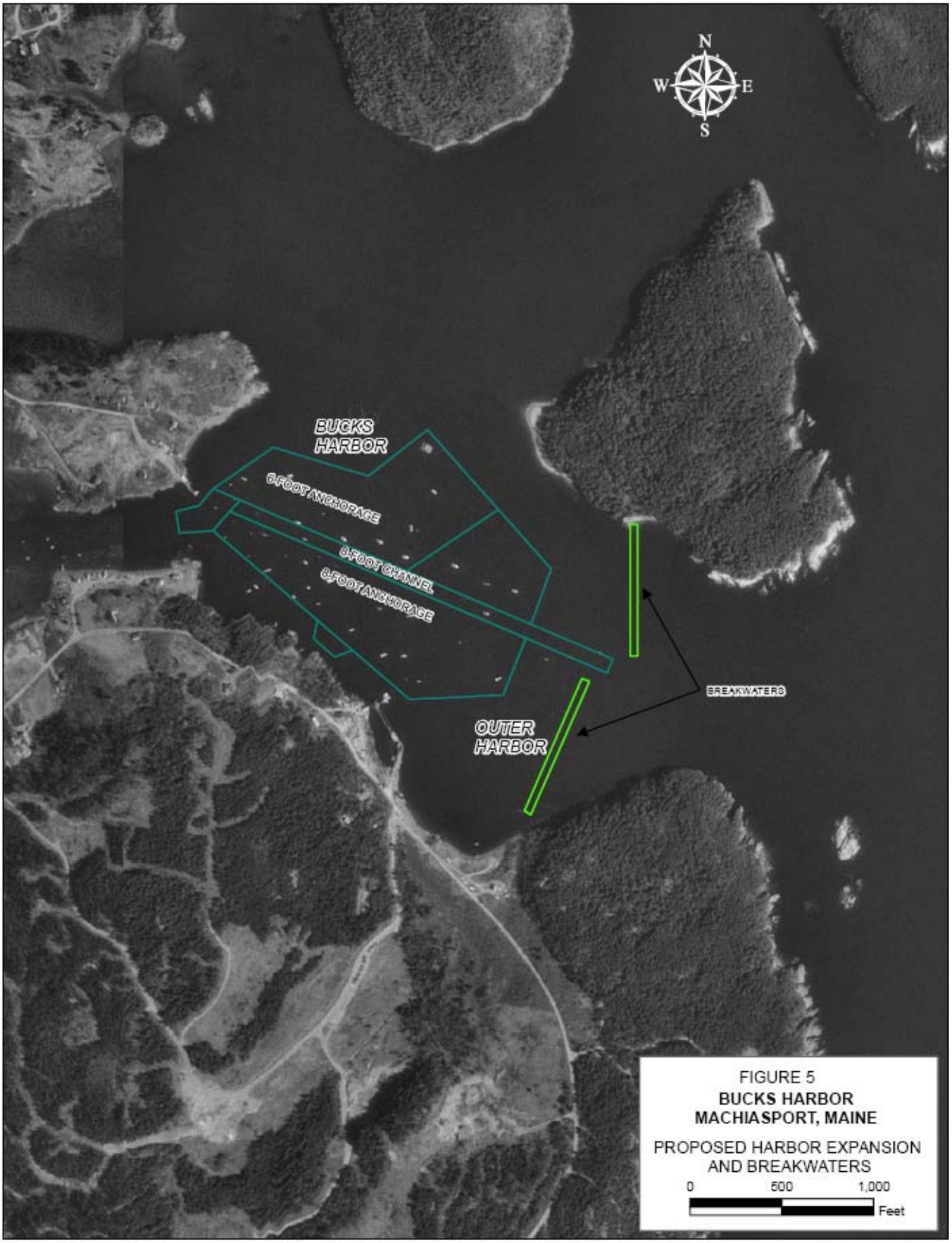
Alternative 4b Involves the creation of a 545' breakwater to the north (Bar Island).

The effects on the marine environment from each plan, at the dredging site, are similar for alternatives 3a to 3e as the overall footprint is the same; the dredging depth just changes. Obviously, larger amounts of generated dredge material will have a greater impact on the chosen disposal site.

Quantity Estimates

Hydrographic surveys conducted by the Corps in 2002 form the basis for quantity and cost estimates for this analysis. In addition, sediment sampling by the Corps has defined the nature of the materials to be dredged from the existing and proposed navigation features, and the bottom sediments at the proposed disposal site. Probing was conducted for the project in 2004 and used in preparing the estimates in this report. Additional probing may be required during the preparation of plans and specifications to confirm the absence of ledge in the expanded anchorage area. The unconsolidated dredged material is composed of a mixture of clays and silts, with some sand mixed in.

The quantity estimates for maintenance of the existing project and for dredging the improvement features are shown below in Table 2. The quantity estimates for ordinary material include a one-foot overdepth pay allowance for dredging tolerance, the typical allowance used for marine dredging in New England waters for channel depths less than 20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BUCKS HARBOR
6-FOOT ANCHORAGE
6-FOOT CHANNEL
6-FOOT ANCHORAGE
BREAKWATERS
OUTER HARBOR
FIGURE 5
BUCKS HARBOR
MACHIASPORT, MAINE
PROPOSED HARBOR EXPANSION AND BREAKWATERS
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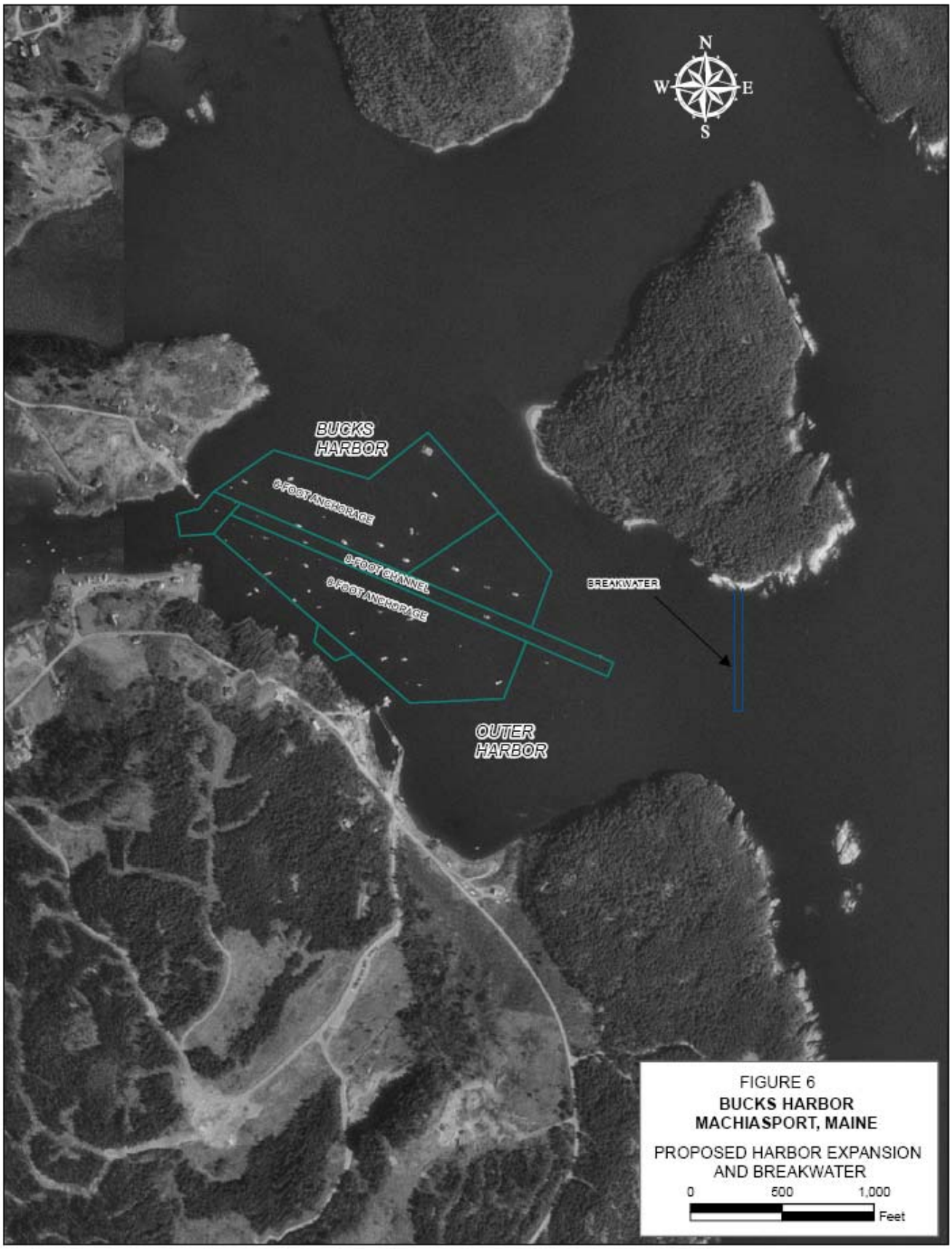
1,000
Feet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BUCKS HARBOR
8-FOOT ANCHORAGE
9-FOOT CHANNEL
8-FOOT ANCHORAGE
BREAKWATER
OUTER HARBOR
FIGURE 6
BUCKS HARBOR
MACHIASPORT, MAINE
PROPOSED HARBOR EXPANSION AND BREAKWATER
0
500
1,000
Feet

feet, and channel design includes side slopes of one on three. An allowance for small boulders was included in the estimates.

TABLE 2
BUCKS HARBOR – DREDGING QUANTITIES

Dredging Quantities (CY)	Alternatives 3A	3B	3C	3D	3E
Maintenance	34,507	5,306	35,341	35,341	34,507
Improvement	51,806	32,889	91,079	226,456	53,669
Maintenance Boulders	10	10	10	10	10
Improvement Boulders	90	90	90	90	90
Totals	86,413	38,295	125,520	261,897	88,276

For alternative 4a it is estimated that approximately 13,000 cy and 21,700 cy of stone will be required to construct the southern and northern breakwaters, respectively. For alternative 4b it is estimated that approximately 35,200 cy of stone will be required to construct the breakwater.

Dredged Material Disposal Alternatives

One potential upland disposal site was identified during the study. The site identified was on private land approximately 8 miles from Bucks Harbor. The use of the identified upland site would require the material to be triple handled as the material would have to be dredged from the harbor, placed in a dewatering area adjacent to the harbor, and then loaded onto trucks to be transported to the disposal area. Although the upland site was identified, no appropriate dewatering areas are available adjacent to the harbor. Additionally, the distance to the upland site as well as the physical nature of the material prevents the possibility of hydraulically pumping the material to the upland site. Therefore, this disposal option is considered impracticable.

Near shore or beach disposal options are also not feasible. The mudflats and shallow waters of the harbor and surrounding bays support soft-shelled clams and eelgrass beds that appear to be very productive. Disposal in one of these areas would not be acceptable from an environmental standpoint. The nature of the material to be dredged is not compatible with any nearby beaches.

The nearest EPA approved ocean disposal site to Buck's Harbor is the Rockland Disposal Site (RDS), which is over 50 miles from the project area. The distance to this disposal site makes its use impracticable.

The material from the 1974 dredging project in Bucks Harbor was disposed of in Machias Bay at the Machias Bay Disposal Site (MADS). The MADS is situated in the central portion of Machias Bay between Ellsworth and St. Andrews, Maine. The site is located approximately 2 miles from Bucks Harbor. This disposal site is the preferred disposal site

for this project. For more information on the MADS site see the attached Environmental Assessment.

Cost Estimates

Dredging for each plan would be accomplished through the use of a mechanical dredge. Material dredged from the anchorages and channel will be loaded into scows and transported to the MADS disposal site. Estimates are based on recent bids for similar work in the New England District. The estimates are also based on use of a mechanical dredge with a four cubic yard bucket operating twelve hours per day, seven days per week. Additional equipment, which might typically be on site, includes a fuel barge, a deck barge with an A-frame lift to remove heavy debris or boulders not suitable for removal by the bucket, a small work boat to assist with moving the dredge and transferring crew, a small survey boat, two scows to handle the dredged material, and a tug to haul the scows to and from the disposal site.

The relocation of navigation aids is a Federal expense to be paid by the United States Coast Guard, and must be included in the project cost if any relocation is necessary. There are no anticipated relocations of U.S. Coast Guard aids to navigation in Bucks Harbor. There are no local aids in the harbor. Therefore there are no costs for aids to navigation under any of the improvement plans.

The haul distance of 2 miles to the MADS disposal site was used to compute cycle times and transit cost. The short distance will permit use of two scows for the work. Costs for preparation of Plans and Specifications, engineering during construction and related costs for management and pre-construction contracting and other activities are included in Engineering and Design costs. Costs for contract administration, and supervision and inspection of the construction contract, including pre-dredge and after-dredge surveys, are included in the Supervision and Administration costs.

The estimated excavation time during construction is about one to three and a half months, depending on the dredging alternative chosen. A summary of the construction costs for the improvement plans is shown below in Table 3. Mobilization and demobilization costs assume a New England contractor. Construction costs include contractor's overhead, bond and profit. Costs were estimated at October 2007 price levels. A contingency of twenty percent has been applied to the construction cost estimate to account for actual variations in quantities and materials, potential weather impacts, bid competition and other factors affecting costs. Unit costs were computed based on a combined maintenance and improvement dredging operation. Mobilization & Demobilization, Engineering & Design, and Supervision & Administration for Alternatives 3a, 3b, 3c, 3d, and 3e are reduced to 60%, 86%, 72%, 87%, and 61%, respectively to account for improvement quantities dredged only.

Costs for construction of the breakwaters were estimated based on similar work recently estimated in Newbury, Massachusetts. A rough of cost of $315/cy was determined and includes the cost of the stone, mobilization/demobilization costs, an assumed haul distance of 100 miles, loading/unloading the stone onto barges, and placing the stone at the site. The duration of the breakwater construction is estimated to be about ten months.

TABLE 3
BUCKS HARBOR – PROJECT FIRST COSTS

Alternative	3A	3B	3C	3D	3E	4A	4B
Construction Quantity						34,700	35,200
Dredging Quantity							
Ordinary Material (CY)	51,806	32,889	91,079	226,456	53,669		
Improvement boulders (CY)	90	90	90	90	90		
Unit Costs						315.00	315.00
Dredging ($/CY)	17.06	21.84	15.15	13.62	16.22		
Boulders ($/CY)	450.00	450.00	450.00	450.00	450.00		
Mobilization/Demobilization	$140,431	$201,285	$168,517	$203,625	$142,772		
Dredging Cost	$883,810	$718,296	$1,379,847	$3,084,331	$870,511		
Boulder Cost	$40,500	$40,500	$40,500	$40,500	$40,500		
Subtotal	$1,064,742	$960,080	$1,588,864	$3,328,456	$1,053,783	$10,930,500	$11,088,000
Engineering & Design	$58,800	$84,280	$70,560	$85,260	$59,780	$98,000	$98,000
Supervision & Administration	$64,200	$92,020	$77,040	$139,200	$65,270	$160,000	$160,000
Total First Cost	$1,187,742	$1,136,380	$1,736,464	$3,552,916	$1,178,833	$11,188,500	$11,346,000

Annual Costs

The costs of dredging and disposal for the Federal project must be annualized to place them on an equal footing to enable comparison to evaluated project benefits. First the total improvement cost of the Federal project is increased for interest during construction, to account for the cost of construction funds over the period of construction, yielding the total investment cost. Project implementation costs are then annualized using factors developed from interest rates adjusted in accordance with Federal statutes and regulations covering evaluation of civil works water resources projects. The period of economic analysis for navigation improvements is 50 years, and the capital recovery factor for the current fiscal year (2007) is 4-7/8 percent amortized over that period. This factor is applied to the investment costs for each plan to determine the annual cost for interest and amortization of the investment cost.

Annual costs also include an annualized estimate of the cost of maintaining the project over the period of analysis. The only annual maintenance cost is periodic maintenance dredging of the improved areas or maintenance of the proposed breakwaters. No maintenance dredging has been done since the existing Federal project was constructed in 1974. Based on the 2002 bathymetric survey, it appears that the harbor has experienced about 1,250 cy/year of shoaling over a 28 year period. This equals about 1.92% annually of the 65,000 cy of ordinary material removed by the 1974 improvement. It is estimated that maintenance dredging of the improved areas would be required once during the project life. For purposes of this study, a shoaling rate of 1.92% has been incorporated into the annual cost of the dredging alternatives. The annual maintenance cost of the breakwater alternatives was estimated to be 0.1% of the original cost. The derivation of annual maintenance costs is shown in Table 4. The annual costs for the alternatives are shown below in Table 5.

TABLE 4
BUCKS HARBOR – ANNUAL MAINTENANCE COSTS

Alternative	3A	3B	3C	3D	3E	4A	4B
Total First Cost	$1,187,742	$1,136,380	$1,736,464	$3,552,916	$1,178,833	$11,188,500	$11,346,000
Interest During Construction	$1,206	$0	$3,560	$18,049	$0	$206,800	$209,700
Implementation Cost	$1,188,947	$1,136,380	$1,740,024	$3,570,965	$1,178,833	$11,395,300	$11,555,700
Ordinary Material - Improvement	51,806	32,889	91,079	226,456	53,669	34,700	35,200
Overall Cost per Cubic Yard	$22.14	$33.32	$18.62	$15.51	$21.21	-	-
Annual Amount	995	631	1,749	4,348	1,030	-	-
Annual Maintenance Cost	$22,027	$21,041	$32,563	$67,438	$21,856	$11,189	$11,346

TABLE 5
BUCKS HARBOR – *ANNUAL COSTS

Alternative	3A	3B	3C	3D	3E	4A	4B
Implementation Cost	$1,188,947	$1,136,380	$1,740,024	$3,570,965	$1,178,833	$11,395,300	$11,555,700
Annual Investment Cost	$63,870	$61,046	$93,474	$191,832	$63,327	$612,156	$620,772
Annual Maintenance Cost	$22,027	$21,041	$32,563	$67,438	$21,856	$11,189	$11,346
Total Annual Cost	$85,897	$82,087	$126,037	$259,271	$85,183	$623,344	$632,118

Note: The total annual costs calculated in the Economic Evaluation, Appendix C, are slightly different (lower) than what is shown in Table 5. This is due to several factors. First, Appendix C annual costs did not apportion the mobilization/demobilization costs between maintenance and improvement. Second, during the development of the appendix, a simplified method for calculating the annual maintenance cost was used. Instead of assuming a percentage of shoal material per year as used above, the 1,250 cy per year rate was multiplied by 30 years, then by an assumed unit cost, discounted and finally annualized.

EVALUATION OF ALTERNATIVES

Environmental Impacts - Dredging

Environmental impacts of dredging in coastal harbors generally involve issues such as:

- Removal of the substrate and its populations of benthic organisms, and the secondary effect on the species that feed on those organisms;
- The effects of turbidity caused by dredging operations on adjacent areas, including impacts on spawning shellfish;
- The level of chemical contaminants in the dredged sediment;
- The potential impact of the dredging and disposal process on listed marine species, particularly fish;
- The disruption of dredging operations in general on transiting and spawning fish species, including their eggs and larvae.

Dredging operations cause both short-term and long-term impacts (see Environmental Assessment). Short-term impacts are related to construction activity and include a temporary increase in turbidity. Long-term impacts include the destruction of some benthic organisms and changing of the physical characteristics within the dredging area.

Testing has revealed that much of the material to be removed under these plans will be fine silts and clays, and a small amount of sand. Using a mechanical dredge would result in some localized turbidity. However, levels of turbidity would decrease with the distance from the dredging area and return to normal levels shortly after dredging ceased.

Dredging of the anchorage will have temporary impacts on the subtidal benthic community. Preliminary investigations have determined an insignificant shellfish habitat exists in the proposed dredging area.

Environmental Impacts - Disposal

Disposal would consist of loading the dredged material into scows and transporting it to the Machias Bay Disposal Site. The area is roughly a 3,700’ x 3,700’ area of the seabed located a couple of miles southeast of Bucks Harbor. The dredged sediments are all class I materials and are therefore suitable for ocean dumping.

Biological impacts in the disposal site area will vary. Mobile finfish and crustaceans are expected to avoid the disposal area and would not be impacted by this activity. Environmental impacts of the disposal of dredged materials at open-water sites would be the burial of organisms presently at the disposal site. Though burial of several species of organisms is anticipated, the density of these creatures would return to background levels within several months.

Cultural Resource Impacts

Coordination has been completed with the Maine State Historic Preservation Officer and the five Maine Federal Indian Tribes which have concurred with our determination that significant cultural resources will not be impacted by the project.

Real Estate Requirements

Maintenance dredging and the improvement project have the same requirements for Sponsor-provided construction access. Under the existing Federal navigation project, the town of Machiasport agreed to provide all lands, easements and rights of ways necessary for construction and future maintenance of the project. The combined maintenance and improvement dredging project now under consideration is confined to the harbor in waters that are entirely tidal, subject to the navigational servitude, and under State and Federal jurisdiction. Disposal of the dredged material is also in open water in Machias Bay. There are no issues of title associated with the dredging or disposal aspects of the project. In addition, no facility/utility relocations will be required in order to implement this project.

A small portion of the town wharf and landing area will be required for non-exclusive use by the Government and its Contractor during maintenance and construction of the project for access to floating construction equipment and the launching of small craft including Corps survey boats. This area will also be used for the contractor's construction trailer and vehicle parking. The town of Machiasport is the sole property owner of the town wharf property. It is anticipated that the Government will only need to use the town wharf property for a couple of months. The town of Machiasport has agreed to provide the required Authorization for Entry for Construction to use the town wharf in accordance with its responsibilities under the existing project's LCA and the requirements of the model Project Cooperation Agreement for the navigation improvement project. The town will receive $0 LERRD credits for the non-exclusive use of the wharf area required for the project purpose. Other than the agreement for temporary access at the town wharf, there are no further real estate requirements for this project. However, should any requirements for real estate interests develop in the future; the town has eminent domain authority to take property for "any public use" under Maine Statutes Title 30A, Chapter 151, Section 3101.

Economic Benefits Evaluation

This section evaluates the benefit of navigation improvements at Bucks Harbor. Benefit classification is from the National Economic Development Account (NED). The analysis of costs and benefits follows standard U.S. Army Corps of Engineers procedures. The reference document used in the benefit estimation process is U.S. Army Corps of Engineers Planning Guidance Notebook, Regulation No. ER 1105-2-40, Appendix A, Section IX NED Benefit Evaluation Procedures: Commercial Fishing. Regional economic benefits were not developed.

The economic analysis is accomplished by determining the economic benefits of each alternative plan, and then determining the economic justification of each plan by comparing benefits with costs. A plan is considered economically justified if the benefits of the plan exceed the costs. The alternative yielding the highest net benefit amount is the NED plan, which optimizes Federal resources.

For the purpose of determining the benefit to cost ratio, benefits and costs are made comparable by conversion to average annual equivalents amortized over a 50-year economic project life. An interest rate of 4-7/8% as specified in the Federal Register is to be used by Federal agencies in the formulation and evaluation of water and land resource plans for the period 1 October 2007 to 30 September 2008. All costs and benefits are stated at the current price level. The project economic life is considered to be 50 years.

The cost estimates, listed in Tables 3, 4, and 5, described fully in Appendix A, are based on several factors including: the quantity and type of dredged material, mobilization and demobilization costs, equipment costs, project design (engineering and supervision) and administrative costs and contingencies. Charges for interest during construction (IDC) are based on varying construction durations and are computed for the purpose of comparing benefits to costs only and are not part of the project first cost.

The detailed economic analysis contained in Appendix C evaluated benefits to the commercial fleet. Only commercial benefits are considered here as the only recreational benefits were incidental to the commercial improvements and were not necessary to project justification. The benefits of the proposed plans of improvement, as described in Appendix C, have been based on the following assumptions:

- Elimination of congestion and tidal delays would result in decreased labor and fuel costs for the commercial vessels.
- Providing additional anchorage and a designated channel in Bucks Harbor would reduce damages experienced by the existing fleet, when moored and underway.
- The benefits to the existing fleet would occur immediately following the implementation of these improvements.

Benefits vary according to each improvement alternative, but all of the dredging alternatives are expected to reduce congestion delays and damages. The breakwater feature only reduces damages caused by waves. Commercial benefits for the alternative plans were measured as a combination of congestion and tidal delays and damages avoided. The commercial fishermen experience delays when entering or leaving the harbor during the recreational season, when the harbor becomes extremely congested. Boats need to navigate slowly through the congested mooring areas in order to leave the harbor or to return to the docks or access a mooring. The congestion delay costs for commercial fishermen are calculated by estimating the value of time lost to delays and the excess fuel burned while delayed. A tidal delay, due to a lack of deep anchorage to moor, also occurs and is similarly calculated.

Total annual benefits from improvements to Bucks Harbor are summarized in Table 6.

TABLE 6
BUCKS HARBOR ECONOMIC BENEFITS SUMMARY

Alternative	3A	3B	3C	3D	3E	4A	4B
Reduced Congestion Delays	$90,900	$90,900	$90,900	$90,900	$90,900	$90,900	$90,900
Reduced Tidal Delays	$61,100	$49,400	$61,100	$61,100	$61,100	$61,100	$61,100
Reduced Damages	$40,300	$40,300	$40,300	$40,300	$40,300	$62,100	$62,100
Total Commercial Benefits	$192,300	$180,600	$192,300	$192,300	$192,300	$214,100	$214,100

A more detailed discussion and breakdown of the commercial benefits can be found in Appendix C. While the existing recreational fleet would benefit incidentally from these improvements, none of the plans were formulated for recreational benefit.

Cost Benefit Analysis – Economic Justification

A plan is considered economically feasible if annualized benefits divided by annualized costs are greater than or equal to one. The net benefit, or plan benefit minus plan cost must be greater than or equal to zero. The feasibility phase requires an analysis of alternatives and the identification of the plan with the largest net benefit, which is labeled the NED plan.

A summary of project benefits compared to project costs for the alternative plans is shown in Table 7. The evaluation determined that commercial navigation benefits were sufficient to justify the single-purpose project. Based on this information four of the dredging alternatives meet the criteria for economic feasibility: each plan has positive annual net benefits and a benefit cost ratio that is over 1.0. Neither of the plans that included the breakwaters were economically justified.

TABLE 7
BUCKS HARBOR – COST-BENEFIT ANALYSIS

Alternative	3A	3B	3C	3D	3E	4A	4B
Total Annual Cost	$85,897	$82,087	$126,037	$259,271	$85,183	$623,344	$632,118
Annual Commercial Benefits	$192,300	$180,600	$192,300	$192,300	$192,300	$214,100	$214,100
Net Annual Benefits	$106,403	$98,513	$66,263	-$66,971	$107,117	-$409,244	-$418,018
Benefit-Cost Ratio	2.24	2.20	1.53	0.74	2.26	0.34	0.34

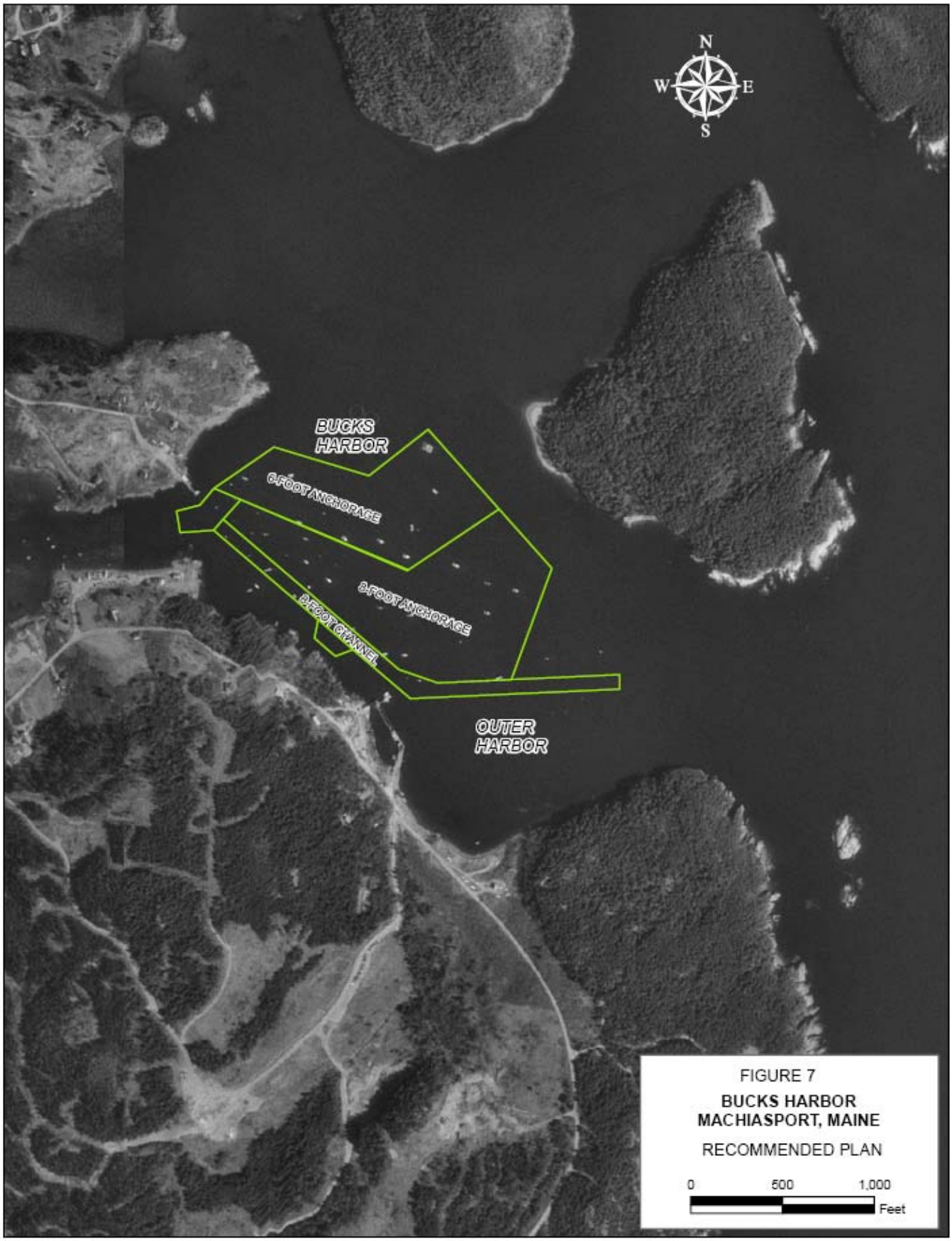
CONCLUSIONS AND RECOMMENDATIONS

The Recommended Plan

Alternative 3E is the NED plan as it maximizes net benefits, but only slightly over Alternative 3A. Alternative 3E is the locally preferred plan as it promotes the more efficient use of the navigation channel along the southern edge of the harbor. Therefore, the recommended plan is Alternative 3E.

The recommended plan, Alternative 3E, as shown in Figure 7, consists of creating an additional 13.5 acres of 6' anchorage, 2.1 acres of 8' deep by 80’ wide channel located along the southern edge of the harbor, and 9.6 acres of additional 8' anchorage. A one acre turning basin is also featured at the terminus of the channel.

These proposed improvements will provide sufficient room to safely accommodate the existing commercial fishing fleet at Bucks Harbor and alleviate the navigational inefficiencies and damages now experienced by that fleet. The recommended plan would require the mechanical dredging of about 53,700 cubic yards of clay and silt. Disposal will occur in the open-water disposal area located in Machias Bay. A one-foot allowable


N
W
E
S
BUCKS HARBOR
6-FOOT ANCHORAGE
8-FOOT ANCHORAGE
8-FOOT CHANNEL
OUTER HARBOR
FIGURE 7
BUCKS HARBOR
MACHIASPORT, MAINE
RECOMMENDED PLAN
0
500
1,000
Feet

overdepth and side slopes of one on three are included in the design for areas of unconsolidated material. The first cost of improvement is estimated to be about $1,179,000.

Maintenance dredging is estimated to occur at least once during the economic life (50 years) of the project with the same dredging and disposal methods being used. There has never been any maintenance dredging done on the existing Federal project since its construction in 1974. About 34,500 cy of maintenance material will need to be removed from the existing project in conjunction with the proposed improvement work.

The selected plan for navigation improvements at Bucks Harbor, Maine, has been based in consideration of the economic efficiency, minimization of environmental impacts, navigational safety and the needs of the sponsoring community. Based on these criteria, Alternative 3E results in the greatest net benefits, and is therefore the NED plan. This plan provides the most favorable improvement method for meeting the project objective of reducing navigation hazards and delays. The plan also complements the town of Machiasport's harbor management plan for Bucks Harbor.

Annual benefits total $192,300 for commercial navigation. These benefits, when compared to a 50-year amortized annual cost of $85,200, yield a benefit-cost ratio of 2.26 and annual net benefits of $107,100.

Cost Apportionment

The Federal and non-Federal cost-sharing responsibilities for the first cost of construction, as stipulated in the Water Resources Development Act of 1986 (Public Law 99-662), as amended, require the local sponsor to contribute 20 percent of the first cost of construction. Ten percent, or half of the total, must be provided up-front prior to issuance of a solicitation for construction. The remaining ten percent of the first cost shall be paid by the sponsor after construction and may be financed over a period of up to 30 years. The remaining share of 80 percent of the first cost is the Federal contribution. The first cost includes the cost of final project design, plans and specifications and solicitation; collectively known as the Plans and Specifications phase. A Project Cooperation Agreement, between the Federal government and the sponsor, will need to be signed at the initiation of the Plans and Specification phase. The apportionment of costs between the Federal government and sponsor is shown below in Table 8.

TABLE 8
BUCKS HARBOR – PROJECT COST-SHARING APORTIONMENT

	Total Cost	Federal Cost	Sponsor Cost
Plans and Specifications Phase	$56,000		
Up-Front Cost		$50,400	$5,600
Construction Phase	$1,123,000		
Up-Front Cost		$1,010,700	$112,300
Remainder Cost-Share		-$117,900	$117,900
Total (Post-Feasibility)	$1,179,000	$943,200	$235,800
Feasibility Study (previously funded)	$330,000	$215,000	$115,000
Total Expenditure	$1,509,000	$1,158,200	$350,800

Sponsor Willingness and Capability

This study was requested by the town of Machiasport, which was the non-Federal sponsor for the feasibility phase. As the cost of the feasibility phase study exceeded $100,000, the town executed a Feasibility Cost-Sharing agreement and provided half of all study costs in excess of that amount. In Maine a municipality may partner with the Federal government in conducting studies and may enter into agreements directly with the Federal government for project construction and future maintenance. The town of Machiasport has fully met its responsibilities under the existing project constructed in 1974.

The non-Federal cost share for initial construction of Federal navigation projects where the authorized depth is no greater than –20 feet mllw is ten percent of the total first cost, including the cost of preparing Plans & Specifications. This ten percent cost, $117,900, is payable in two installments: $5,600 is due at the beginning of Plans & Specifications and the remainder, $112,300, is due prior to solicitation of the construction contract. In addition, the Sponsor must provide an additional ten percent of the first cost after completion of construction. The Sponsor must also provide all lands, easements, rights of way and relocations (LERRs) required for construction and maintenance of the project at no cost to the Federal government. LERR requirements for this project are limited to access to the municipal landing during construction.

The town of Machiasport has agreed to act as the non-Federal Sponsor for this project and has agreed to execute the Project Cooperation Agreement (PCA). The town has also agreed to provide construction access agreements to the Corps for the use of the municipal wharf

The following is a list of items of local cooperation required for projects authorized under Section 107. The local sponsor must provide assurance of intent to meet these items prior to project authorization.

1. Assume full responsibility for all non-Federal costs associated with the project. Current law requires that the non-Federal sponsor provide 20% of the first cost of construction of the General Navigation facilities not exceeding 20 feet in depth.

2. Provide, maintain and operate without cost to the United States, an adequate public landing open and available to use for all on an equal basis.

3. Provide without cost to the United States, all necessary lands, easements and rights of way necessary for project construction and subsequent maintenance, and acceptable disposal areas.

4. Hold and save the United States free from damages that may result from construction and maintenance of the project.

5. Provide and maintain mooring facilities as needed for transient and local vessels as well as necessary access roads, parking areas and other needed public use shore facilities open and available to all on an equal basis. Only minimum basic facilities and services are required as part of the project. The actual scope or extent of facilities and services provided over and above the required minimum is a matter of local decision. The manner of financing such facilities and services is a local responsibility.

6. Assume full responsibility for all project costs in excess of the Federal cost limitation of $7,000,000. The Federal cost limitation includes prior construction costs and all investigations, planning, engineering, supervision, inspection, and administration involved in the development and construction of the project. The total Federal expenditures for this project are estimated to be about $1,158,200.

7. Federal navigation projects must be managed in the general public interest and must be accessible and available to all on equal terms. Any number of approaches may be used to assure that all citizens desiring mooring or other access to the projects are treated impartially; it is not the Federal Government's intention to prescribe specific procedures. A management system shall be considered acceptable provided that it:

    - Makes no arbitrary distinction or requirement of any kind in allocating use of the project and ancillary facilities and services to the public except as may be consistent with the purpose for which the project was constructed.

    - Does not impose arbitrary fees or arbitrary variations in fees among users. The cost of providing necessary management and ancillary facilities and services may be offset through equitable user fees based on the actual costs incurred.

    - Provides information pertinent to harbor management including but not limited to rules and regulations, lists of mooring holders, waiting lists and fee schedules that is readily available to the public at all times.

Conclusions

Since commercial navigation is a high-priority budget output, there is strong Federal interest in implementing the project. The evaluation of benefits to modification of the existing project by providing additional anchorage and improved channel features indicates that the anticipated economic outputs meet the objectives and public interest requirements of ER 1105-2-100 "Planning Guidance Notebook", 22 April 2000. All aspects of the Federal interest, including engineering feasibility, economic justification, design optimization and environmental acceptability and social and cultural resource impacts, have been analyzed in detail during the feasibility study at a level of detail commensurate with the magnitude of the proposed improvement.

The New England District, Corps of Engineers, has reviewed and evaluated all pertinent data concerning the proposed plan for improving navigation at Bucks Harbor. The Corps has also reviewed and evaluated the stated views of interested agencies and concerned public regarding the alternative plans. The possible consequences of each alternative have been evaluated on the basis of engineering feasibility, environmental impact and economic efficiency.

Alternative 3E will result in the greatest economic net benefits and is therefore the NED Plan. This plan will create 13.5 acres of 6' anchorage, 2.1 acres of 8’ deep x 80’ wide channel located along the southern edge of the harbor, and 9.6 acres of additional 8' anchorage. A one acre turning basin is also featured at the terminus of the channel. Disposal of the dredge material will be at a deep-water site located two miles southeast of Bucks Harbor in Machias Bay.

During the consultations with U.S. Fish and Wildlife Service and National Marine Fisheries Service, a contracted seasonal work restriction was developed. To avoid and minimize impacts on various life stages of federally managed and forage species, mobilization shall be limited to after October 1 and dredging and disposal shall occur between November 1 and April 15.

Recommendation

The recommendation of this feasibility level investigation is that modification of the existing project for navigation at Bucks Harbor, Machiasport, Maine, consisting of (1) creating 13.5 acres of 6' anchorage, (2) creating 9.6 additional acres of 8’deep anchorage, (3) designating an 8’deep x 80’wide channel along the southern side of the harbor, and (4) creating a one acre 8’deep turning basin at the western terminus of the channel, be adopted under the continuing authority of Section 107 of the River and Harbor Act of 1960, as amended. Disposal of the dredge material would be at a deep-water site located southeast of Bucks Harbor in Machias Bay. The project purpose is commercial navigation. The town of Machiasport has agreed to execute a Project Cooperation Agreement with the Government for construction and future maintenance of the project modifications as the non-Federal Sponsor.

The recommendations contained herein reflect the policies governing formulation of individual projects and the information available at this time. They do not necessarily reflect program and budgeting priorities inherent in local and state programs, or the

formulation of a national Civil Works water resources program. Consequently, the recommendations may be modified at higher levels within the Executive Branch before they are used to support funding. However, prior to executing a Project Cooperation Agreement, the non-Federal Sponsor will be advised of any modifications and will be afforded an opportunity to comment further.

Date

PHILIP T. FEIR
Colonel, Corps of Engineers
District Commander

CERTIFICATE OF REVIEW FOR LEGAL SUFFICIENCY

The draft Section 107 Navigation Improvement Study Feasibility Report and Environmental Assessment for Bucks Harbor, Machiasport, Maine dated March 2008, has been reviewed by the Office of Counsel, New England District and is approved as legally sufficient.

4/30/08
Date

John P. Almeida
John P. Almeida
Assistant District Counsel

Appendix A

Engineering Design and Cost Estimates

NAVIGATION IMPROVEMENT FEASIBILITY STUDY
BUCKS HARBOR
MACHIASPORT, ME

ENGINEERING DESIGN

&

COST ESTIMATES

March 2008

Engineering and Design
Navigation Improvements for Bucks Harbor, ME

Bucks Harbor is located in the town of Machiasport about 70 miles east of Ellsworth, about 25 miles west of Lubec and the Canadian border, and empties into Machias Bay. The harbor is small having an area of about 60 acres. The outer harbor has general depths ranging from 30 feet at the entrance to Machias Bay to 3-9 feet below mean lower low water (mllw) in the more protected mooring area, while the inner harbor has a controlling depth greater than 4 feet above mllw. Therefore, with a tide range of 12.5 feet much of the inner harbor is exposed during the tidal cycle. The shoreline is primarily ledge and cobble beaches. On the north side of the harbor a cobble bar exists that separates the usable harbor from additional area. Moorings are maintained by individuals and are located both in the existing 8' anchorage and outside of the anchorage to the north in shallower waters. Also, many boats are trailer borne and are launched daily at the cobble beaches. Allowance for a fairway currently exists for the vessels heading for the Atlantic Salmon wharf at the western end of the harbor. The existing 8' anchorage is about 11 acres with an additional 2 acres for the fairway. There is no fairway laid out for access to the new town pier on the south side of the harbor or the lobster pound adjacent to the pier. It appears that over-crowding of the existing anchorage leads to vessel damages and that there is a lack of access to the town pier, lobster pound, and Atlantic Salmon wharf. Hydrographic surveys conducted in July and August 2002 form the basis for the quantity and cost estimates.

Anchorage Design

Anchorage design is a function of many factors, including currents, vessel size, traffic conditions, congestion, vessel motion, and maneuverability. The size of an anchorage is also dependant on the mooring type utilized – single point or fore and aft mooring. Single point mooring allows the vessels to rotate around the mooring lines as the wind and current conditions require. Fore and aft moorings allow for vessels to be fixed in one location. This in turn saves on anchorage space for the same number of vessels. The Bucks Harbor anchorage will assume a continuation of the existing practice of single point mooring.

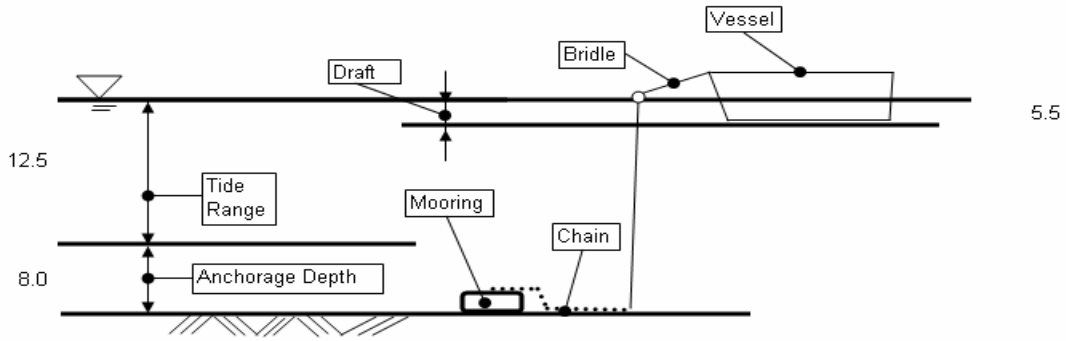
Information provided by the town harbormaster for the year 2005 was analyzed for vessel length, draft, chain length, and bridle length. Chain length is part of the total radius of swing of a moored vessel. The chain would normally be stretched on the bottom extending from the mooring block to a line that goes to the mooring buoy. As the tide rises the mooring buoy moves upward pulling the chain off of the bottom and somewhat shortening the swing radius. The bridle is the line from the mooring buoy to a float such as a milk jug. The float is snagged by the vessel operator, hauled onboard by pulling the bridle and thus allowing the vessel to be tied to the bridle line. The maximum radius of the swing circle is therefore a function of the combined length of the chain, bridle, and vessel length. Figure B-1 presents a graphical representation of anchorage area calculations.

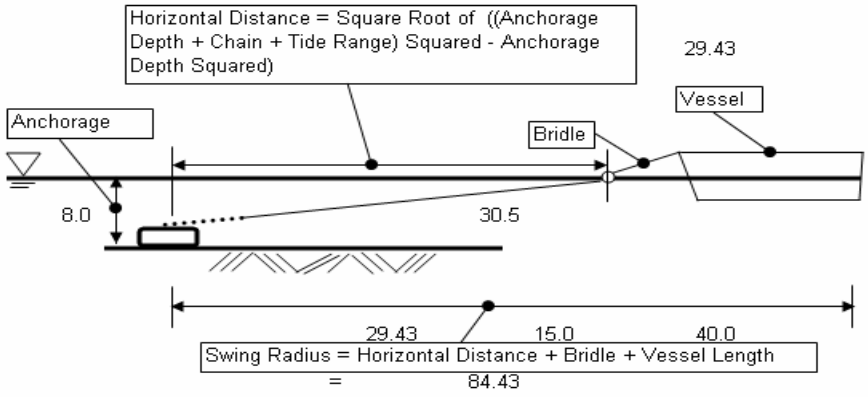
Anchorage Calculations

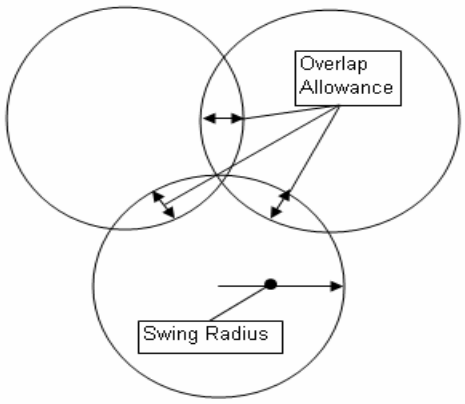
Given:	Vessel Length =	40
	Chain Length =	10
	Bridle Length =	15
	Tide Range =	12.5
	Draft =	5.5
	Under Keel Clearance =	2.5
	Number of Vessels =	50
	Overlap Allowance (%) =	20

Required Area for Single Vessel (SF)		
22,396	0.51	Acres
Required Area for All Vessels (SF)		
895,840	20.6	Acres

Anchorage Depth = Draft + Under Keel Clearance = 8







20 Percent

Figure B-1

Anchorage areas must be sized according to the likely demand for moorings. The information provided was grouped into five categories of lengths – less than 30', 30-34', 35-40', 41-45', and greater than 45'. Existing conditions indicate that for the three shortest categories the average chain length was about 20' while the larger two categories averaged longer at 49.2'. However, it was unclear if the chain length reported was actually the chain alone or the chain plus a line equal to the anchorage depth and tide range, which seemed more reasonable. Also, it was reported that bridle length averaged between 20.8' and 30' with an increase in vessel length. For the purposes of our anchorage layout calculations a shorter bridle length of 15' was used.

Anchorage area depths must be sized based on vessel drafts plus allowances for wave action and squat while underway lumped under the heading of underkeel clearances. Wave action was assumed to require 1.5' and squat 1' (total underkeel clearance 2.5'). Drafts of the vessel categories also followed a pattern with the shorter vessels typically drawing the least water. Drafts were grouped into five categories - less than 1.4', 1.5-3.4', 3.5-4.4', 4.5-6.5', and greater than 6.5'. From the data reported, half of the vessels had drafts up to 3.4'.

Since a pattern of swing circles whose edges are just touching would contain areas where no vessel would swing over, an allowance for overlapping swing circles was made. Vessels tend to swing at individual rates rather than in unison meaning the overlapping allowance should be limited to perhaps no more than 25%.

The total design anchorage required for the harbor was based on 94 vessels (includes actual boats, floats, lobster cars, and work barges used by the salmon industry) divided into 44 requiring 6' anchorage depths and 50 requiring 8' anchorage depths. The design chain length design was 10' making the total distance from the mooring block to the mooring buoy either 28.5 (10 + 6 + 12.5) or 30.5' (10 + 8 + 12.5). Design vessels were 30' long with drafts of 3.5' for the 6' anchorage and 40' long with drafts of 5.5' for the 8' anchorage. Bridle length was 15' for both the 6' and 8' anchorages. Overlapping of 20% was allowed. The area calculated for the 6' anchorage was 13.5 acres and for the 8' anchorage was 20.6 acres.

One design alternative includes direct access to both the town pier and the Atlantic Salmon wharf. This alternative provides for an 80' wide channel along the southwest side of the harbor with a 150' x 300' turning basin adjacent to the Atlantic Salmon wharf. Moorings may be laid out and used as deemed necessary by the town harbormaster for access to the town pier and the lobster pound.

Quantities

Quantities of material to be excavated from the anchorages were calculated by comparing the existing bottom surface to an idealized bottom surface having side slopes of 1 vertical to 3 horizontal. The existing bottom surface was surveyed in July and August 2002. The data was converted into a MicroStation file and through the InRoads program a digital terrain model was created for both the existing surface and the improved surface. By comparing the two surfaces the quantity of material to be dredged was calculated. Figure B-2 and Table B-1 are a summary of that work.

The various plans are made from combining the components shown in Table B-1. Typically the plans will have a maintenance component as well as an improvement component. For example, Plan 3A is composed of a 6' anchorage area, an 8' center channel, an 8' turning basin, and an 8' anchorage. A portion of the 13.5 acre 6' anchorage falls within the footprint of the existing federal project and is considered maintenance dredging while the remaining area is improvement dredging. Similarly, a portion of the center channel, turning basin and 8' anchorage lie within the existing federal project. By subtracting the maintenance from the four main components the quantities for the plans were broken into an improvement quantity and a maintenance quantity and shown in Table B-2. A detailed breakdown of the maintenance and improvement quantities can be found in Table B-4 at the end of this appendix.

FIGURE B-2
ANCHORAGES AREAS

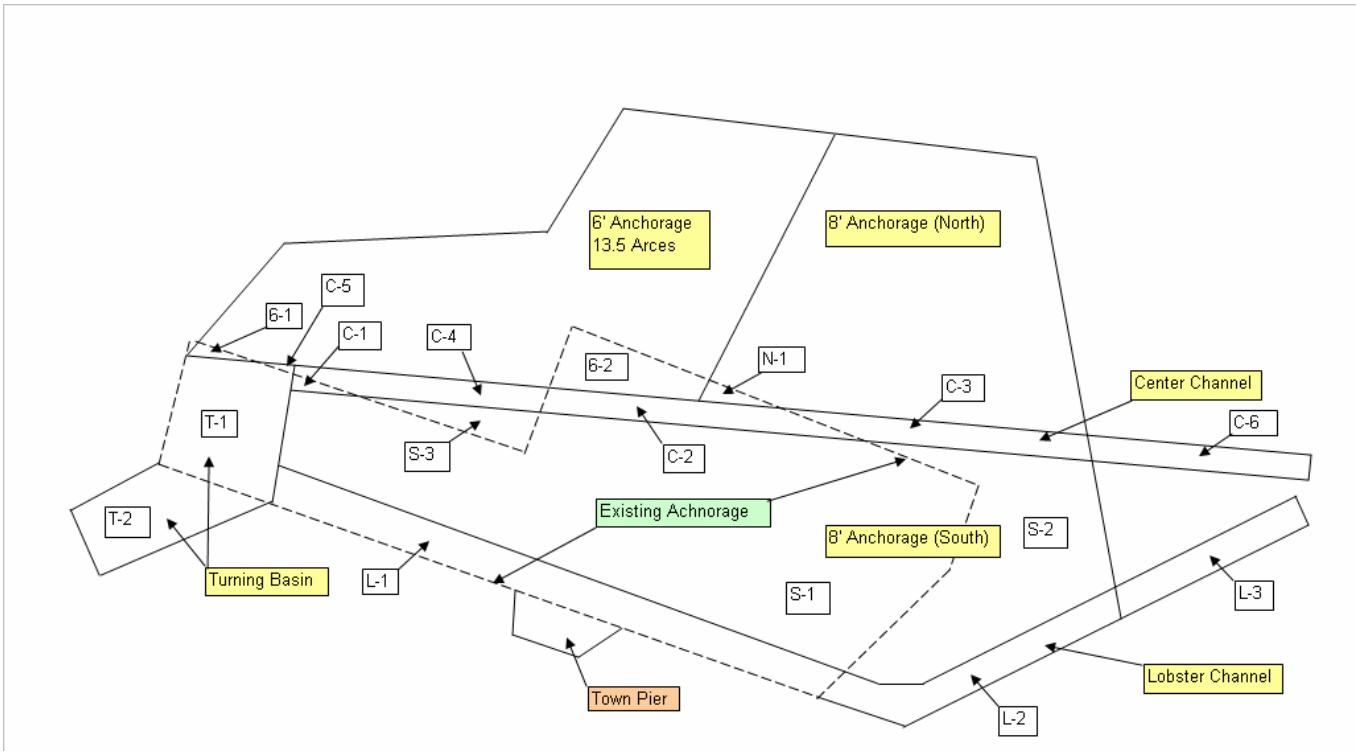


TABLE B-1
ANCHORAGES AREAS AND QUANTITIES

Component	Area (SF)	Depths (MLLW)					
		6	7	8	9	10	11
13.5 acre 6' Anchorage	593,699	12,290	25,543	44,003	65,650	89,032	112,950
20.6 acre 8' Anchorage	899,300			18,894	40,642		
8' Anchorage (North)	247,469	111	423	1,243	3,724	11,937	21,620
8' Anchorage (South)	665,093	689	6,366	20,313	42,278	67,847	94,133
Center Channel	177,764	1,217	3,306	5,741	9,245	15,730	23,530
Lobster Channel	202,455			8,823	16,468	25,132	34,629
Turning Basin	46,563	946	2,557	4,508	5,523	7,532	9,564
Town Pier	18,000			1,669	2,544	3,502	4,544
Existing Anchorage	579,614	526	5,126	15,842	33,791	56,139	79,355
T-1	28,590	193	1,142	2,307	3,567	4,913	6,350
6-1	657	5	44	104	188	299	438
6-2	29,101	0	0	158	690	1,761	3,040
C-1	5,580	63	307	603	954	1,360	1,824
C-2	42,735	0	1	110	875	2,532	4,400
N-1	2,066	0	0	0	17	108	233
L-1	107,022	185	1,831	5,612	10,098	14,963	20,178
S-1	363,853	92	1,981	7,588	18,952	33,232	48,079

Disposal Area

The disposal area for the dredged material will be an ocean disposal site about two miles from the harbor in Machias Bay. All the dredged material would be dredged using a mechanical dredge with clamshell bucket and hauled to the disposal site in scows. The disposal site was previously used in the improvement dredging that took place in 1974.

Cost Estimate

The cost estimate of the proposed work was prepared using the Corps of Engineers Dredge Estimating program for a mechanical (clamshell) dredge. The assumptions made for mechanical dredging were that the shallow harbor would require a small (1000 cy) scow and a dredging plant using a 4 cy clamshell bucket. The open water disposal area was assumed to be two miles from the harbor. Costs for permits were assumed to be $10,000. Costs for monitoring during disposal were assumed to be $20,000. The dredge quantities and areas for the alternatives examined were provided above.

The estimated time of construction is one to three and a half months depending on the alternative chosen. A summary of the construction costs is shown below in Table B-2. Mobilization and demobilization costs assume a New England contractor. Construction costs include contractor's overhead, bond and profit. Costs were estimated at October 2007 price levels. A contingency of twenty percent was applied to the construction cost estimate to account for actual variations in quantities and materials, potential weather impacts, bid competition and other factors affecting dredging production and costs.

Costs for preparation of Plans and Specifications, engineering during construction and related costs for management and pre-construction contracting and other activities are included in Engineering and Design costs. Costs for contract administration and supervision, and inspection of the construction contract, including pre-dredge and after-dredge surveys, are included in the Supervision and Administration costs.

TABLE B-2
BUCKS HARBOR – PROJECT COSTS

Alternative	3A	3B	3C	3D	3E
Construction Quantity					
Dredging Quantity					
Maintenance (CY)	34,507	5,306	35,341	35,341	34,507
Improvement (CY)	51,806	32,889	91,079	226,456	53,669
Maintenance boulders (CY)	10	10	10	10	10
Improvement boulders (CY)	90	90	90	90	90
Unit Costs					
Dredging ($/CY)	17.06	21.84	15.15	13.62	16.22
Boulders ($/CY)	450.00	450.00	450.00	450.00	450.00

Mobilization/Demobilization	$234,052	$234,052	$234,052	$234,052	$234,052
Dredging Cost	$1,472,500	$834,179	$1,915,263	$3,565,675	$1,430,215
Boulder Cost	$45,000	$45,000	$45,000	$45,000	$45,000
Subtotal	$1,751,552	$1,113,231	$2,194,315	$3,844,727	$1,709,267
Engineering & Design	$98,000	$98,000	$98,000	$98,000	$98,000
Supervision & Administration	$107,000	$107,000	$107,000	$160,000	$107,000
Total First Cost	$1,956,552	$1,318,231	$2,399,315	$4,102,727	$1,914,267

E&D Costs

Plans & Specs					
Project Management	21,000	21,000	21,000	21,000	21,000
Design	18,000	18,000	18,000	18,000	18,000
Cost	6,000	6,000	6,000	6,000	6,000
Environmental	12,000	12,000	12,000	12,000	12,000
ITR	6,000	6,000	6,000	6,000	6,000
Specs	8,000	8,000	8,000	8,000	8,000
Survey	14,000	14,000	14,000	14,000	14,000
Contracting	3,000	3,000	3,000	3,000	3,000
BCOE	4,000	4,000	4,000	4,000	4,000
Engineering During Const.					
EDC	6,000	6,000	6,000	6,000	6,000
TOTAL E&D	98,000	98,000	98,000	98,000	98,000

S&A Costs

Contract Administration	3,000	3,000	3,000	3,000	3,000
S&I	66,000	66,000	66,000	110,000	66,000
Survey	20,000	20,000	20,000	20,000	20,000
Project Management	18,000	18,000	18,000	27,000	18,000
TOTAL	107,000	107,000	107,000	160,000	107,000

The above table was adjusted to reflect only the improvement quantities. This required apportioning the Mobilization & Demobilization, Engineering & Design, and Supervision & Administration for alternatives 3a, 3b, 3c, 3d, and 3e by reducing them to 60%, 86%, 72%, 87%, and 61%, respectively. These results are shown in Table B-3 below.

TABLE B-3
BUCKS HARBOR – PROJECT COSTS

Alternative		3A	3B	3C	3D	3E
Construction Quantity						
Dredging Quantity						
	Ordinary Material (CY)	51,806	32,889	91,079	226,456	53,669
	Improvement boulders (CY)	90	90	90	90	90
Unit Costs						
	Dredging ($/CY)	17.06	21.84	15.15	13.62	16.22
	Boulders ($/CY)	450.00	450.00	450.00	450.00	450.00
Mobilization/Demobilization		$140,431	$201,285	$168,517	$203,625	$142,772
Dredging Cost		$883,810	$718,296	$1,379,847	$3,084,331	$870,511
Boulder Cost		$40,500	$40,500	$40,500	$40,500	$40,500
Subtotal		$1,064,742	$960,080	$1,588,864	$3,328,456	$1,053,783
Engineering & Design		$58,800	$84,280	$70,560	$85,260	$59,780
Supervision & Administration		$64,200	$92,020	$77,040	$139,200	$65,270
Total First Cost		$1,187,742	$1,136,380	$1,736,464	$3,552,916	$1,178,833

TABLE B-4
MAINTENANCE AND IMPROVEMENT QUANTITIES

Separating into Improvement and Maintenance

Alternative 3a	Required			Overdepth		
6' Anchorage	12,290			25,543		
6-1	5			44		
6-2	0	5	Maintenance	0	44	Maintenance
	12,285	Improvement		25,499	Improvement	
8' Center Channel	5,741			9,245		
C-1	603			954		
C-2	110	713	Maintenance	875	1,829	Maintenance
	5,028	Improvement		7,416	Improvement	
8' Turning Basin	4,508			5,523		
T-1	2,307	Maintenance		3,567	Maintenance	
	2,201	Improvement		1,956	Improvement	
8' Anchorage (North)	1,243			3,724		
8' Anchorage (South)	20,313			42,278		
	21,556			46,002		
N-1	0			17		
S-1	7,588			18,952		
L-1	5,612	13,200	Maintenance	10,098	29,067	Maintenance
	8,356	Improvement		16,935	Improvement	
Total Maintenance	5			44		
	713			1,829		
	2,307			3,567		

	13,200			29,067		
	16,225			34,507		
Total Improvement	12,285			25,499		
	5,028			7,416		
	2,201			1956		
	8,356			16,935		
	27,870			51,806		

Separating into Improvement and Maintenance

Alternative 3b	Required			Overdepth		
6' Anchorage	12,290			25,543		
6-1	5			44		
6-2	0	5	Maintenance	0	44	Maintenance
	12,285	Improvement		25,499	Improvement	
6' Center Channel	1,217			3,306		
C-1	63			307		
C-2	0	63	Maintenance	1	308	Maintenance
	1,154	Improvement		2,998	Improvement	
6' Turning Basin	946			2,557		
T-1	193	Maintenance		1,142	Maintenance	
	753	Improvement		1,415	Improvement	
6' Anchorage (North)	111			423		
6' Anchorage (South)	689			6,366		
	800			6,789		
N-1	0			0		
S-1	92			1,981		

L-1	185	277	Maintenance	1,831	3,812	Maintenance
	523	Improvement		2,977	Improvement	
Total Maintenance	5			44		
	63			308		
	193			1,142		
	277			3,812		
	538			5,306		
Total Improvement	12,285			25,499		
	1,154			2,998		
	753			1415		
	523			2,977		
	14,715			32,889		

Separating into Improvement and Maintenance

Alternative 3c	Required			Overdepth		
8' Anchorage	44,003			65,650		
6-1	104			188		
6-2	158	262	Maintenance	690	878	Maintenance
	43,741	Improvement		64,772	Improvement	
8' Center Channel	5,741			9,245		
C-1	603			954		
C-2	110	713	Maintenance	875	1,829	Maintenance
	5,028	Improvement		7,416	Improvement	
8' Turning Basin	4,508			5,523		
T-1	2,307	Maintenance		3,567	Maintenance	
	2,201	Improvement		1,956	Improvement	

8' Anchorage (North)	1,243			3,724		
8' Anchorage (South)	20,313			42,278		
	21,556			46,002		
N-1	0			17		
S-1	7,588			18,952		
L-1	5,612	13,200	Maintenance	10,098	29,067	Maintenance
	8,356	Improvement		16,935	Improvement	
Total Maintenance	262			878		
	713			1,829		
	2,307			3,567		
	13,200			29,067		
	16,482			35,341		
Total Improvement	43,741			64,772		
	5,028			7,416		
	2,201			1956		
	8,356			16,935		
	59,326			91,079		

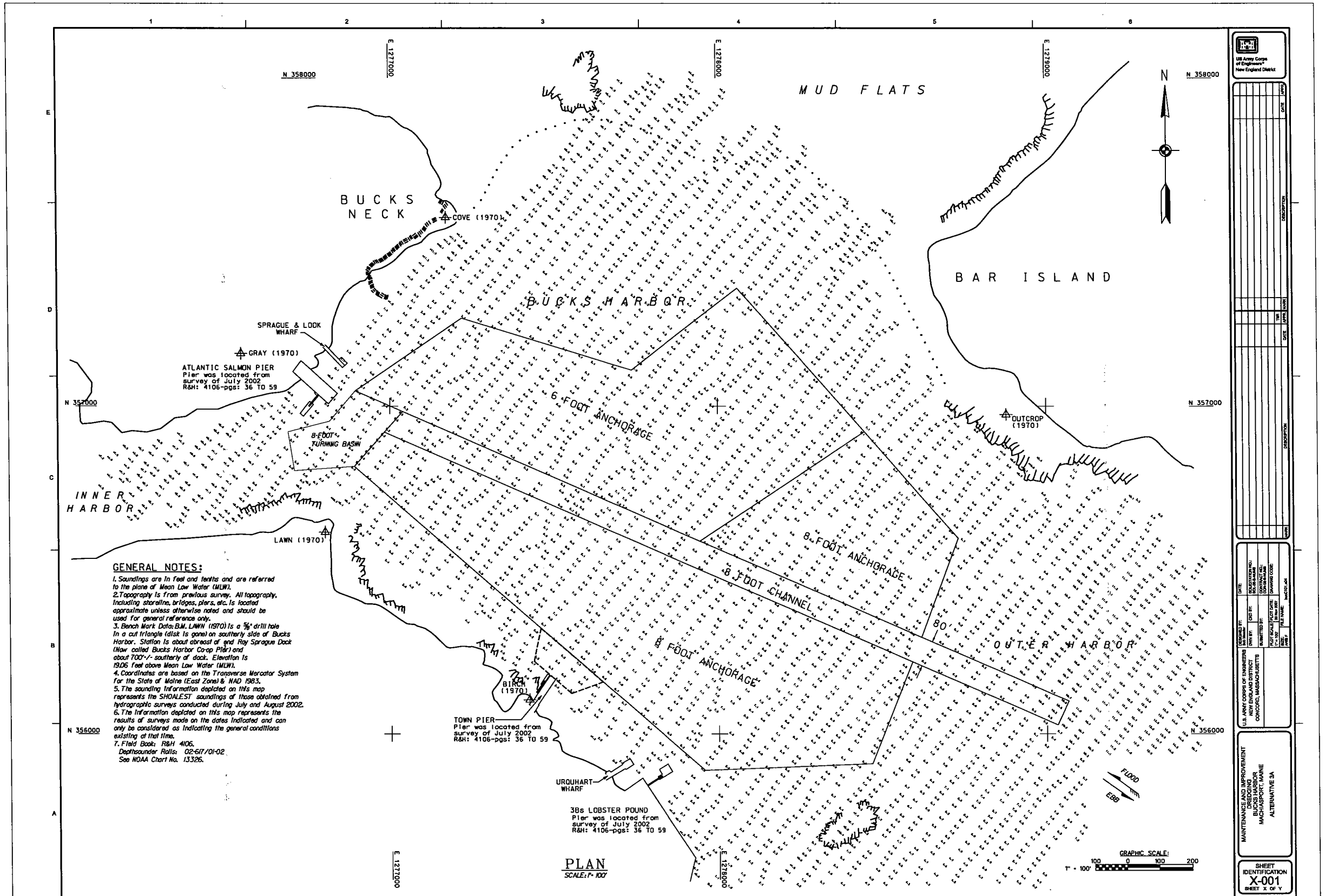
Separating into Improvement and Maintenance

Alternative 3d	Required			Overdepth		
10' Anchorage	89,032			112,950		
6-1	104			188		
6-2	158	262	Maintenance	690	878	Maintenance
	88,770	Improvement		112,072	Improvement	
10' Center Channel	15,730			23,530		

C-1	603			954		
C-2	110	713	Maintenance	875	1,829	Maintenance
	15,017	Improvement		21,701	Improvement	
10' Turning Basin	7,532			9,564		
T-1	2,307	Maintenance		3,567	Maintenance	
	5,225	Improvement		5,997	Improvement	
10' Anchorage (North)	11,937			21,620		
10' Anchorage (South)	67,847			94,133		
	79,784			115,753		
N-1	0			17		
S-1	7,588			18,952		
L-1	5,612	13,200	Maintenance	10,098	29,067	Maintenance
	66,584	Improvement		86,686	Improvement	
Total Maintenance	262			878		
	713			1,829		
	2,307			3,567		
	13,200			29,067		
	16,482			35,341		
Total Improvement	88,770			112,072		
	15,017			21,701		
	5,225			5997		
	66,584			86,686		
	175,596			226,456		

Separating into Improvement and Maintenance

Alternative 3e	Required			Overdepth		
6' Anchorage	12,290			25,543		
6-1	5			44		
6-2	0	5	Maintenance	0	44	Maintenance
	12,285	Improvement		25,499	Improvement	
8' Lobster Channel	8,823			16,468		
L-1	5,612	Maintenance		10,098	Maintenance	
	3,211	Improvement		6,370	Improvement	
8' Turning Basin	4,508			5,523		
T-1	2,307	Maintenance		3,567	Maintenance	
	2,201	Improvement		1,956	Improvement	
8' Anchorage	18,894			40,642		
N-1	0			17		
S-1	7,588			18,952		
C-1	603			954		
C-2	110	8,301	Maintenance	875	20,798	Maintenance
	10,593	Improvement		19,844	Improvement	
Total Maintenance	5			44		
	5,612			10,098		
	2,307			3,567		
	8,301			20,798		
	16,225			34,507		
Total Improvement	12,285			25,499		
	3,211			6,370		
	2,201			1,956		
	10,593			19,844		
	28,290			53,669		



GENERAL NOTES:

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6. The information depicted on this map represents the results of surveys made on the dates indicated and can only be considered as indicating the general conditions existing at that time.
7. Field Book: R&H 4106.
   Depthsounder Ratio: 02-617/01-02
   See NOAA Chart No. 13326.

PLAN

SCALE: 1" = 100'

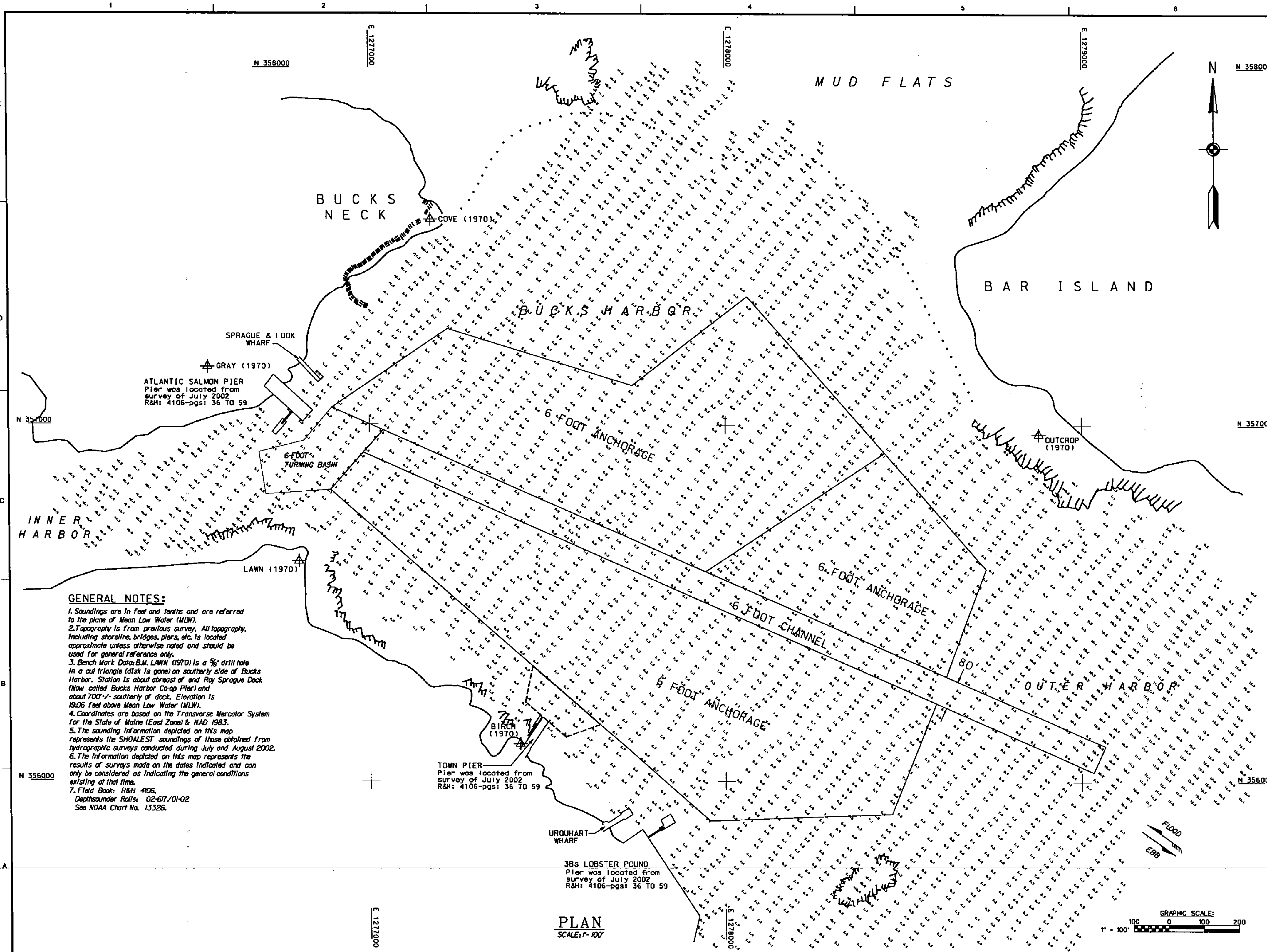
US Army Corps of Engineers® New England District

DESIGNED BY:	DATE:	REVISIONS NO.
DRAWN BY:	CHK'D BY:	DESCRIPTION
SUBMITTED BY:		CONTRACT NO.
PLOT SCALE: 1" = 100'	PLOT DATE: 24 Nov 2003	DRAWING NO.
FILE NAME:		

U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
CONCORD, MASSACHUSETTS

MAINTENANCE AND IMPROVEMENT DREDGING
BUCKS HARBOR
MACHIASPORT, MAINE
ALTERNATIVE 3A

SHEET IDENTIFICATION
X-001
SHEET X OF Y



GENERAL NOTES:

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5. The sounding information depicted on this map represents the SHOALEST soundings of those obtained from hydrographic surveys conducted during July and August 2002.
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Depthsounder Rolls: 02-617/01-02
See NOAA Chart No. 13326.

PLAN
SCALE: 1"= 100'

US Army Corps of Engineers®
New England District

MARK	DESCRIPTION	DATE	APPR.	MARK	DESCRIPTION	DATE	APPR.

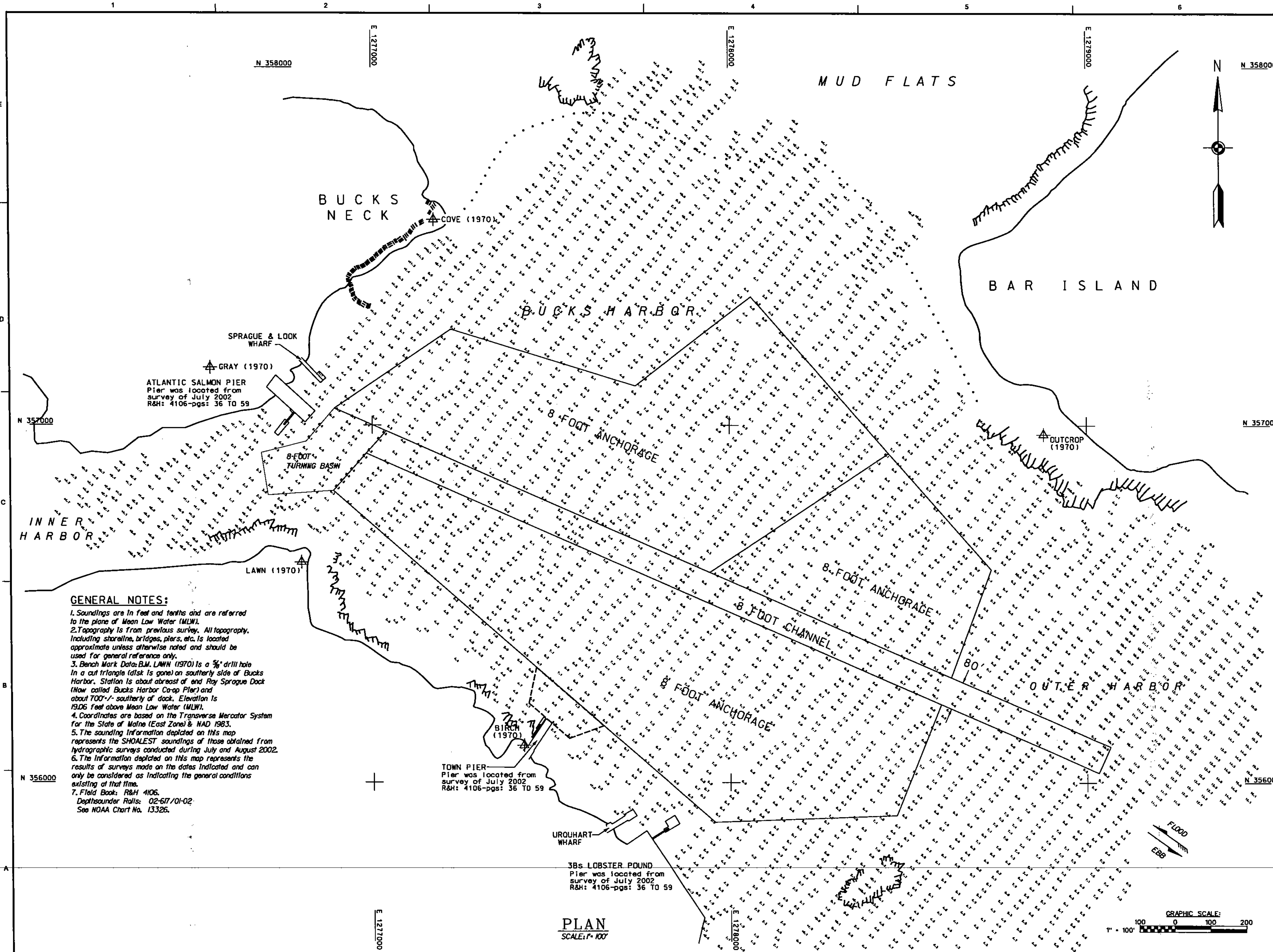
DESIGNED BY: Bob Meader		DATE:
DWN BY:	CKD BY:	SOLICITATION NO.:
SUBMITTED BY:		CONTRACT NO.:
PLOT SCALE: 1" = 100'	PLOT DATE: 30 Nov 2007	DRAWING CODE:
SIZE: ANSI F	FILE NAME: bucC101.p04	

U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
CONCORD, MASSACHUSETTS

MAINTENANCE AND IMPROVEMENT
DREDGING
BUCKS HARBOR
MACHIASPORT, MAINE

ALTERNATIVE 3B

SHEET IDENTIFICATION
X-001
SHEET X OF Y



US Army Corps of Engineers
New England District

MARK	DESCRIPTION	DATE	APPR.

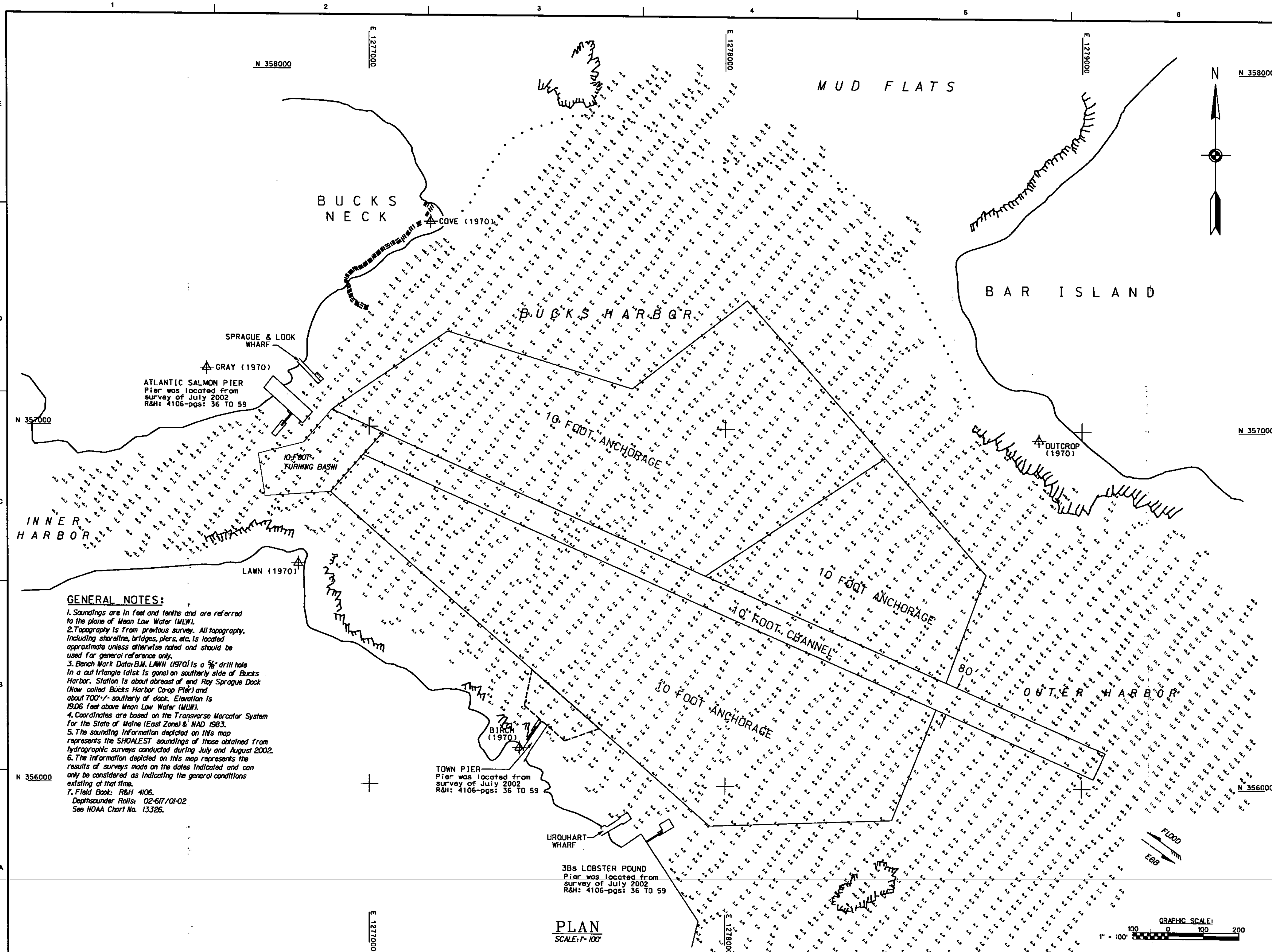
U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
CONCORD, MASSACHUSETTS

DESIGNED BY: Bob Meader
DWN BY:
CKD BY:
SUBMITTED BY:
PLOT SCALE: 1" = 100'
PLOT DATE: 20 Nov 2007
SIZE: ANSI F
FILE NAME: bucC101.a04
DATE:
SOLICITATION NO.:
CONTRACT NO.:
DRAWING CODE:

MAINTENANCE AND IMPROVEMENT
DREDGING
BUCKS HARBOR
MACHIASPORT, MAINE

ALTERNATIVE 3C

SHEET IDENTIFICATION
X-001
SHEET X OF Y



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7. Field Book: R&H 4106.
   Depthsounder Rolls: 02-617/01-02
   See NOAA Chart No. 13326.

PLAN

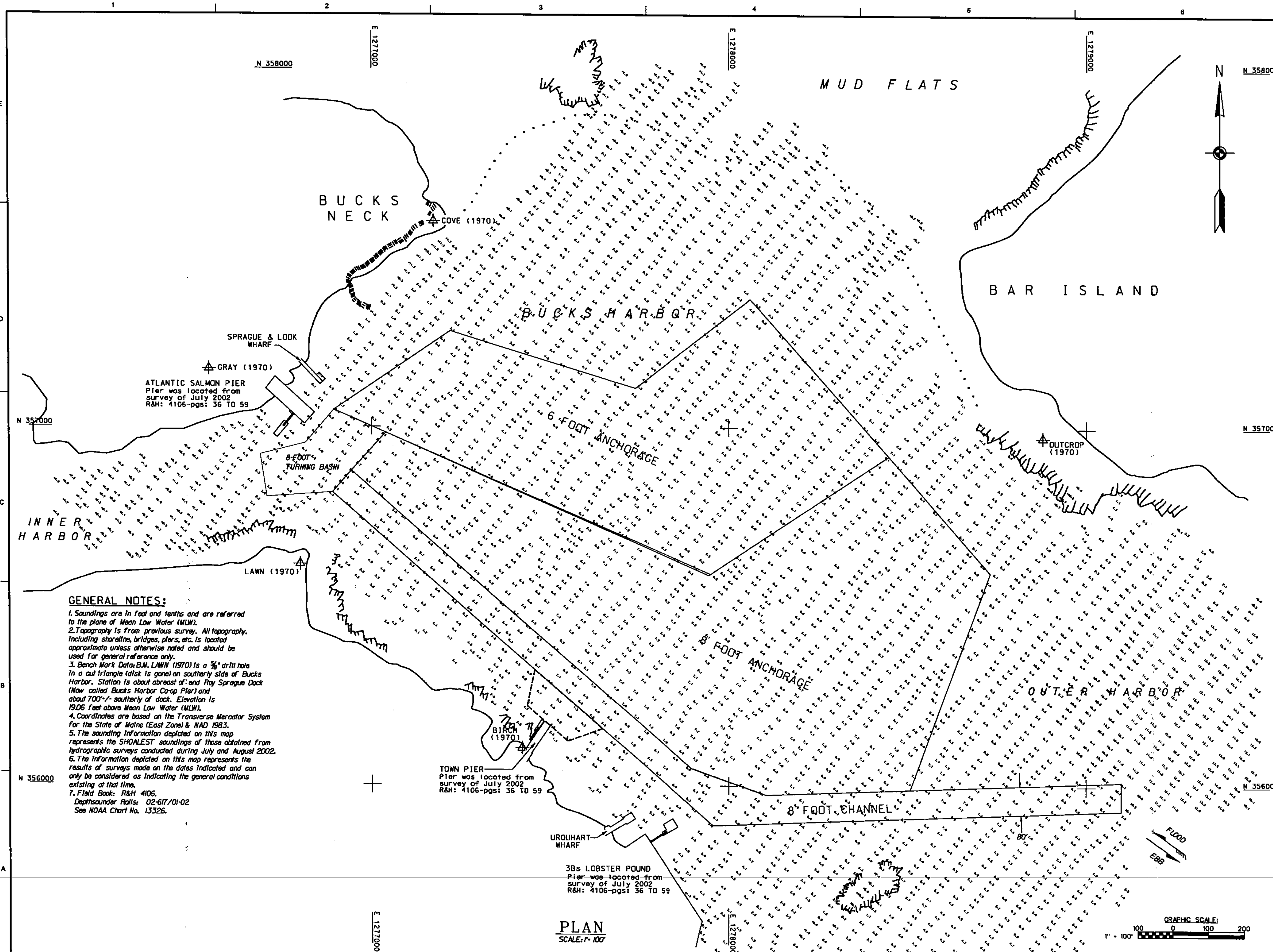
SCALE: 1" = 100'

US Army Corps of Engineers New England District

U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
CONCORD, MASSACHUSETTS

MAINTENANCE AND IMPROVEMENT DREDGING
BUCKS HARBOR
MACHIASPORT, MAINE
ALTERNATIVE 3D

SHEET IDENTIFICATION
X-001
SHEET X OF Y



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7. Field Book: R&H 4106.
Depthsounder Rolls: 02-617/01-02
See NOAA Chart No. 13326.

US Army Corps of Engineers®
New England District

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
CONCORD, MASSACHUSETTS

DESIGNED BY: Bob Meader		DATE:
DWN BY:	CKD BY:	SOLICITATION NO.: SOL-06-B-NUMB
SUBMITTED BY:		CONTRACT NO.: CON-06-B-NUMB
PLOT SCALE: 1" = 100'	PLOT DATE: 20 Mar 2007	DRAWING CODE:
SIZE: ANSI F	FILE NAME: bucC101.s04	

MAINTENANCE AND IMPROVEMENT
DREDGING
BUCKS HARBOR
MACHIASPORT, MAINE

ALTERNATIVE 3E

SHEET IDENTIFICATION
X-001
SHEET X OF Y

MOBIL & DEMOB COST: $234,052

BID QUANTITY 86,313 C.Y.
UNIT COST... $17.06 PER C.Y.
EXCAV. COST. $1,472,500
TIME..... 1.45 MONTHS

Bucks Harbor Dredge - 3A

CHECKLIST FOR INPUT DATA.

PG 1.....PROJECT -	Bucks Harbor Dredge - 3A		
LOCATION -	Bucks Harbor Machiasport, ME		
INVIT # -	0		
DATE OF EST. -	October 15, 2007		
EST. BY -	William Herland		
MOB. BID ITEM # -	1		
EXCAV. BID ITEM # -	2		
PG 2.....TYPE OF EST. -	Planning Estimate		
CONTRACTOR'S O.H. -	20.0%		
CONTRACTOR'S PROFIT -	10.0%		
CONTRACTOR'S BOND -	2.0%		
PG 3...DREDGING AREA -	1,547,193	sf	
REQ'D EXCAVATION -	44,095	cyds	
PAY OVERDEPTH -	42,218	cyds	
CONTRACT AMOUNT -	86,313	cyds	
NOT DREDGED -	4,315	cyds	
NET PAY -	81,998	cyds	
NONPAY YARDAGE -	28,700	cyds	
GROSS YARDAGE -	110,698	cyds	
NONPAY HEIGHT -	0.5	ft overdig	
TOTAL BANK HEIGHT -	1.9	ft	
PG 4.....DREDGE SEL. -	4 CY CLAMSHELL		
TYPE OF MATERIAL -	SAND		
BUCKET SIZE -	4		
BUCKET FILL FACTOR -	0.70		
OPTIMUM BANK -	2		
BANK FACTOR -	0.95		
PG 5.....BUCKET CYCLE -	45	Seconds	
OTHER FACTOR -	0.90	weather and tides.	
CLEANUP -	10%	More Time	
TIME EFFICIENCY -	60.0%	of EWT	
PG 6...TUG DESCRIPT. -	1000	HP Diesel--Twin Screw	
PREPARE SCOW TOW -	15	min	
HAUL DIST -	2	mi	
SPEED TO D/A -	4	mph (30 min)	
SPEED FROM D/A -	5	mph (24 min)	
DUMP OR PUMPOUT -	10	min	
DISENGAGE TOW -	10	min	
TOW EFFICIENCY -	45	%	
SCOW DESCRIPTION -	1,000	CY Split Hull Scow	
USEABLE VOLUME -	60	%	
% SOLIDS -	65	% (390 cy/load)	

PG 7.....DREDGES -	1
SCOWS @ DREDGE -	1
TOWING VESSELS -	1
SCOWS PER TOW -	1
ADDITIONAL SCOWS -	0
TOT SCOWS ON JOB -	2
PG 8....QTRS ON DREDGE? -	NO
SURVEY BOAT? -	YES
CREW BOAT? -	YES

PG 9...SP COST/MO (1ST) -	$20,000	Monitoring
SP COST/MO (2ND-14TH) -	$0	From Sheet D\4
SPECIAL COST LS (1ST) -	$10,000	Permit
SP COST LS (2ND-14TH) -	$0	From Sheet E
PG 10....PRESENT YEAR -	2007	
ECONOMIC INDEX -	7441	
LAF -	1.180	
INTEREST RATE -	5.250%	/yr
TIME PERIOD -	January to June 2008	
PIPELINE AVAILABILITY -	9	mos/yr
BUCKET AVAILABILITY -	10	mos/yr
HOPPER AVAILABILITY -	10	mos/yr
FUEL PRICE -	$3.25	/gal

EXCAVATION PRODUCTION	-	174	cy/hr (gross)
EXCAVATION EWT	-	60.0%	(438 hrs/mo)
EXCAVATION TIME	-	1.45	months
HAULING PRODUCTION	-	263	cy/hr (gross)
HAULING EWT	-	45.0%	(329 hrs/mo)
HAULING TIME	-	1.28	months
DREDGING TIME	-	1.45	months
EXCAVAT EWT (ADJUSTED)	-	438	hrs/mo (60.0% EWT)
HAULING EWT (ADJUSTED)	-	290	hrs/mo (39.7% EWT)
PRODUCTION (GROSS)	-	76,212	cy per month
PRODUCTION (CONTRACT)	-	56,550	pay cy per month

56,550 pay c.y. per month	UNIT COST...	$17.06	PER C.Y.	Select Dredge: 4 CY CLAMSHELL
174 c.y. per hr, 60.0% EWT-->	EXCAV TIME..	1.45	MONTHS	
263 c.y. per hr, 45.0% EWT-->	HAUL TIME...	1.28	MONTHS	

PROJECT TITLES: PG 1 of 10

Project Name.....	Bucks Harbor Dredge - 3A
Project Location.....	Bucks Harbor Machiasport, ME
Invit. or Contr. No.....	.....
Date of Estimate.....	October 15, 2007
Estimator.....	William Herland
Checked by.....	Chris Lindsay

Ver. 1.0

For Information, Call:
Julie Davin
Ph: 509-527-7514

(Input Project Descriptions on Sheet A) Goto Sheet A

Mobilization Bid Item..... 1

Excavation Bid Item..... 2 Goto Area Factors

TYPE OF ESTIMATE PG 2 of 10

Type of Estimate..... 1 Planning Estimate

(1) Planning, (2) Bid, or (3) Mod Estimate Descriptions

INDIRECT COSTS:

Contractor's Overhead...	20.0	Percent of contract
Contractor's Profit.....	10.0	Percent of contract
Contractor's Bond.....	2.0	Percent of contract

ESTIMATED DREDGING QUANTITY: PG 3 of 10

Non-Pay Computation Method: 1

(1) Surface Area, (2) % of Pay O.D., (3) % of Net Pay, (4) % of Gross

DREDGING AREA: 1,547,193 SQ. FT.

DREDGING PRISM:

Required....	44,095	C.Y.		
+ Pay O.D....	42,218	C.Y.		
Bid Quantity	86,313	C.Y.		
- Not Dug..	4,315	C.Y.		AVE. BANK HEIGHT:
Net Pay	81,998	C.Y.	@	1.4 ft pay
+ Non-Pay	28,700	C.Y.	@	0.5 ft overdig
Gross Volume	110,698	C.Y.		1.9 FT. BANK HT.

56,550 pay c.y. per month	UNIT COST...	$17.06	PER C.Y.	Select Dredge
174 c.y. per hr, 60.0% EWT-->	EXCAV TIME..	1.45	MONTHS	4 CY CLAMSHELL
263 c.y. per hr, 45.0% EWT-->	HAUL TIME...	1.28	MONTHS	

EXCAVATION PRODUCTION WORKSHEET: PG 4 of 10

CURRENT DREDGE SELECTED: 4 CY CLAMSHELL

Type of Material..... 2 SAND

(0) Unspecified Materials, (1) Mud, (2) Clays and Less-Dense Sand,
or (3) Dense Clays, Hard-Packed Sand, Blasted Rock and Boulders

PRODUCTION FACTORS:	Override	Default	Used
Bucket Size (in CY).....		4	4
Bucket Fill Factor.....		0.70	0.70
Optimum Bank (in Feet)..	2	2.5	2.0
Bank Factor.....		0.95	0.95
(based on 1.9 Ft of Bank Height)			

EXCAVATION PRODUCTION WORKSHEET: PG 5 of 10

Bucket Cycle Time..... 45 Seconds

Other Factor..... 0.90
Description..... weather and tides.

Cleanup Dredging..... 10 % Additional Time
(Cleanup Factor = 0.91)

Time Efficiency.....> 60.0 % of Effective Work Time
438 Hours Per Month

HAULING PRODUCTION WORKSHEET: PG 6 of 10

Towing Cycle: 1000 HP Diesel--Twin Screw

Prepare Scow for Tow.... 15 Minutes
One-Way Haul Distance... 2 Miles
Speed to Disposal Area.. 4 Miles per hour = 30 Min
Speed from Disposal Area 5 Miles per hour = 24 Min
Dumping or Pumpout..... 10 Minutes
Disengage Scow Tow..... 10 Minutes
Average Cycle Time: 89 Minutes per Trip

Towing Time Efficiency.. 45 Percent

Scow Capacity: 1000 CY Split Hull Scow

Useable Volume..... 60 Percent
Percent Solids..... 65 Percent = 390 cys/load

56,550 pay c.y. per month	UNIT COST...	$17.06	PER C.Y.	Select Dredge: 4 CY CLAMSHELL
174 c.y. per hr, 60.0% EWT-->	EXCAV TIME..	1.45	MONTHS	
263 c.y. per hr, 45.0% EWT-->	HAUL TIME...	1.28	MONTHS	

EQUIPMENT MATCHING: PG 7 of 10

	Override	Assumed	Used
# of Dredges.....	0	1	1
Scows per Dredge.....	0	1	1
# of Towing Vessels.....	0	1	1
Scows per Tow.....	0	1	1

Scows with Dredges: 1 (1 Dredge(s) x 1 Scow(s) Each)
Scows with Tows: 1 (1 Tug(s) x 1 Scow(s) Each)
Additional Scows..... 0

Total Scows on Job: 2

SPECIAL LABOR & EQUIPMENT: PG 8 of 10

(1 for Yes, 0 for No)	Override	Assumed	Used
Quarters on Dredge?.....	0	NO	NO
Survey Boat?.....	1	NO	YES
Crew Boat?.....	1	NO	YES

OTHER PRICING ADJUSTMENTS: PG 9 of 10

Other Monthly Costs:

1st Input..... $20,000 Per Month
Description..... Monitoring
(For Additional Inputs Go to Sheet D\4) Goto Sheet D/4

Fixed Costs:

1st Input..... $10,000 Lump Sum
Description..... Permit
(For Additional Inputs Go to Sheet E) Goto Sheet E

(To Adjust Labor Go To Sheet DB_L) Goto Sheet DB_L

(To Adjust Equipment Go To Sheet DB_E) Goto Sheet DB_E

56,550 pay c.y. per month	UNIT COST...	$17.06	PER C.Y.	Select Dredge: 4 CY CLAMSHELL
174 c.y. per hr, 60.0% EWT-->	EXCAV TIME..	1.45	MONTHS	
263 c.y. per hr, 45.0% EWT-->	HAUL TIME...	1.28	MONTHS	

The Factors below normally will not change for every estimate.

LOCAL AREA FACTORS: PG 10 of 10

Present Year.....	2007	(Equipment Calculations)
Economic Index.....	7441	(EP-1110-1-8, APP E)
Labor Adjustment Factor.	1.180	(EP-1110-1-8, APP B)
Full Cost of Money Rate.	5.25	Percent per Year
Dates for Money Rate....	January to June 2008	
Annual Months Available for Dredging:		
Pipeline....	9	Months per Year
Bucket.....	10	Months per Year
Hopper.....	10	Months per Year
Current Fuel Price.....	$3.25	Per Gallon

Return

MOBIL & DEMOB COST: $234,052

Bucks Harbor Dredge - 3B

CHECKLIST FOR INPUT DATA.

BID QUANTITY	38,195 C.Y.
UNIT COST...	$21.84 PER C.Y.
EXCAV. COST.	$834,179
TIME.....	0.83 MONTHS

PG 1.....PROJECT -	Bucks Harbor Dredge - 3B
LOCATION -	Bucks Harbor Machiasport, ME
INVIT # -	0
DATE OF EST. -	October 15, 2007
EST. BY -	William Herland
MOB. BID ITEM # -	1
EXCAV. BID ITEM # -	2

PG 2.....TYPE OF EST. -	Planning Estimate
CONTRACTOR'S O.H. -	20.0%
CONTRACTOR'S PROFIT -	10.0%
CONTRACTOR'S BOND -	2.0%

PG 3...DREDGING AREA -	910,736 sf
REQ'D EXCAVATION -	15,253 cyds
PAY OVERDEPTH -	22,942 cyds
CONTRACT AMOUNT -	38,195 cyds
NOT DREDGED -	1,910 cyds
NET PAY -	36,285 cyds
NONPAY YARDAGE -	16,900 cyds
GROSS YARDAGE -	53,185 cyds
NONPAY HEIGHT -	0.5 ft overdig
TOTAL BANK HEIGHT -	1.6 ft

PG 4.....DREDGE SEL. -	4 CY CLAMSHELL
TYPE OF MATERIAL -	SAND
BUCKET SIZE -	4
BUCKET FILL FACTOR -	0.70
OPTIMUM BANK -	2
BANK FACTOR -	0.80

PG 5.....BUCKET CYCLE -	45 Seconds
OTHER FACTOR -	0.90 weather & tide
CLEANUP -	10% More Time
TIME EFFICIENCY -	60.0% of EWT

PG 6...TUG DESCRIPT. -	1000 HP Diesel--Twin Screw
PREPARE SCOW TOW -	15 min
HAUL DIST -	2 mi
SPEED TO D/A -	4 mph (30 min)
SPEED FROM D/A -	5 mph (24 min)
DUMP OR PUMPOUT -	10 min
DISENGAGE TOW -	10 min
TOW EFFICIENCY -	45 %
SCOW DESCRIPTION -	1,000 CY Split Hull Scow
USEABLE VOLUME -	60 %
% SOLIDS -	65 % (390 cy/load)

PG 7.....DREDGES -	1
SCOWS @ DREDGE -	1
TOWING VESSELS -	1
SCOWS PER TOW -	1
ADDITIONAL SCOWS -	0
TOT SCOWS ON JOB -	2

PG 8....QTRS ON DREDGE? -	NO
SURVEY BOAT? -	YES
CREW BOAT? -	YES

PG 9...SP COST/MO (1ST) -	$20,000 Monitoring
SP COST/MO (2ND-14TH) -	$0 From Sheet D\4
SPECIAL COST LS (1ST) -	$10,000 Permit
SP COST LS (2ND-14TH) -	$0 From Sheet E

PG 10....PRESENT YEAR -	2007
ECONOMIC INDEX -	7441
LAF -	1.180
INTEREST RATE -	5.250% /yr
TIME PERIOD -	January to June 2008
PIPELINE AVAILABILITY -	9 mos/yr
BUCKET AVAILABILITY -	10 mos/yr
HOPPER AVAILABILITY -	10 mos/yr
FUEL PRICE -	$3.25 /gal

EXCAVATION PRODUCTION	-	146 cy/hr (gross)
EXCAVATION EWT	-	60.0% (438 hrs/mo)
EXCAVATION TIME	-	0.83 months
HAULING PRODUCTION	-	263 cy/hr (gross)
HAULING EWT	-	45.0% (329 hrs/mo)
HAULING TIME	-	0.61 months
DREDGING TIME	-	0.83 months
EXCAVAT EWT (ADJUSTED)	-	438 hrs/mo (60.0% EWT)
HAULING EWT (ADJUSTED)	-	243 hrs/mo (33.3% EWT)
PRODUCTION (GROSS)	-	63,948 cy per month
PRODUCTION (CONTRACT)	-	43,717 pay cy per month

43,717 pay c.y. per month	UNIT COST...	$21.84	PER C.Y.	**Select Dredge**
146 c.y. per hr, 60.0% EWT-->	EXCAV TIME..	0.83	MONTHS	4 CY CLAMSHELL
263 c.y. per hr, 45.0% EWT-->	HAUL TIME...	0.61	MONTHS	

PROJECT TITLES: PG 1 of 10

Project Name.....	Bucks Harbor Dredge - 3B	Ver. 1.0
Project Location.....	Bucks Harbor Machiasport, ME	For Information, Call:
Invit. or Contr. No.....		Julie Davin
Date of Estimate.....	October 15, 2007	Ph: 509-527-7514
Estimator.....	William Herland	
Checked by.....	Chris Lindsay	

(Input Project Descriptions on Sheet A) Goto Sheet A

Mobilization Bid Item..... 1

Excavation Bid Item..... 2 Goto Area Factors

TYPE OF ESTIMATE PG 2 of 10

Type of Estimate..... 1 Planning Estimate

(1) Planning, (2) Bid, or (3) Mod Estimate Descriptions

INDIRECT COSTS:

Contractor's Overhead...	20.0	Percent of contract
Contractor's Profit.....	10.0	Percent of contract
Contractor's Bond.....	2.0	Percent of contract

ESTIMATED DREDGING QUANTITY: PG 3 of 10

Non-Pay Computation Method: 1

(1) Surface Area, (2) % of Pay O.D., (3) % of Net Pay, (4) % of Gross

DREDGING AREA: 910,736 SQ. FT.

DREDGING PRISM:

Required....	15,253	C.Y.		
+ Pay O.D....	22,942	C.Y.		
Bid Quantity	38,195	C.Y.		
- Not Dug..	1,910	C.Y.		AVE. BANK HEIGHT:
Net Pay	36,285	C.Y.	@	1.1 ft pay
+ Non-Pay	16,900	C.Y.	@	0.5 ft overdig
Gross Volume	53,185	C.Y.		1.6 FT. BANK HT.

43,717 pay c.y. per month	UNIT COST...	$21.84	PER C.Y.	Select Dredge: 4 CY CLAMSHELL
146 c.y. per hr, 60.0% EWT-->	EXCAV TIME..	0.83	MONTHS	
263 c.y. per hr, 45.0% EWT-->	HAUL TIME...	0.61	MONTHS	

EXCAVATION PRODUCTION WORKSHEET: PG 4 of 10

CURRENT DREDGE SELECTED: 4 CY CLAMSHELL

Type of Material..... 2 SAND

(0) Unspecified Materials, (1) Mud, (2) Clays and Less-Dense Sand, or (3) Dense Clays, Hard-Packed Sand, Blasted Rock and Boulders

PRODUCTION FACTORS:	Override	Default	Used
Bucket Size (in CY).....		4	4
Bucket Fill Factor.....		0.70	0.70
Optimum Bank (in Feet)..	2	2.5	2.0
Bank Factor.....		0.80	0.80
(based on 1.6 Ft of Bank Height)			

EXCAVATION PRODUCTION WORKSHEET: PG 5 of 10

Bucket Cycle Time..... 45 Seconds

Other Factor..... 0.90
Description..... weather & tide

Cleanup Dredging..... 10 % Additional Time
(Cleanup Factor = 0.91)

Time Efficiency.....> 60.0 % of Effective Work Time
438 Hours Per Month

HAULING PRODUCTION WORKSHEET: PG 6 of 10

Towing Cycle: 1000 HP Diesel--Twin Screw

Prepare Scow for Tow....	15	Minutes
One-Way Haul Distance...	2	Miles
Speed to Disposal Area..	4	Miles per hour = 30 Min
Speed from Disposal Area	5	Miles per hour = 24 Min
Dumping or Pumpout.....	10	Minutes
Disengage Scow Tow.....	10	Minutes
Average Cycle Time:	89	Minutes per Trip
Towing Time Efficiency..	45	Percent

Scow Capacity: 1000 CY Split Hull Scow

Useable Volume.....	60	Percent
Percent Solids.....	65	Percent = 390 cys/load

43,717 pay c.y. per month	UNIT COST...	$21.84	PER C.Y.	Select Dredge: 4 CY CLAMSHELL
146 c.y. per hr, 60.0% EWT-->	EXCAV TIME..	0.83	MONTHS	
263 c.y. per hr, 45.0% EWT-->	HAUL TIME...	0.61	MONTHS	

EQUIPMENT MATCHING: PG 7 of 10

	Override	Assumed	Used
# of Dredges.....	0	1	1
Scows per Dredge.....	0	1	1
# of Towing Vessels.....	0	1	1
Scows per Tow.....	0	1	1

Scows with Dredges: 1 (1 Dredge(s) x 1 Scow(s) Each)
Scows with Tows: 1 (1 Tug(s) x 1 Scow(s) Each)
Additional Scows..... 0

Total Scows on Job: 2

SPECIAL LABOR & EQUIPMENT: PG 8 of 10

(1 for Yes, 0 for No)	Override	Assumed	Used
Quarters on Dredge?.....	0	NO	NO
Survey Boat?.....	1	NO	YES
Crew Boat?.....	1	NO	YES

OTHER PRICING ADJUSTMENTS: PG 9 of 10

Other Monthly Costs:

1st Input..... $20,000 Per Month
Description..... Monitoring
(For Additional Inputs Go to Sheet D\4) Goto Sheet D/4

Fixed Costs:

1st Input..... $10,000 Lump Sum
Description..... Permit
(For Additional Inputs Go to Sheet E) Goto Sheet E

(To Adjust Labor Go To Sheet DB_L) Goto Sheet DB_L

(To Adjust Equipment Go To Sheet DB_E) Goto Sheet DB_E

43,717 pay c.y. per month	UNIT COST...	$21.84	PER C.Y.	Select Dredge: 4 CY CLAMSHELL
146 c.y. per hr, 60.0% EWT-->	EXCAV TIME..	0.83	MONTHS	
263 c.y. per hr, 45.0% EWT-->	HAUL TIME...	0.61	MONTHS	

The Factors below normally will not change for every estimate.

LOCAL AREA FACTORS: PG 10 of 10

Present Year.....	2007	(Equipment Calculations)
Economic Index.....	7441	(EP-1110-1-8, APP E)
Labor Adjustment Factor.	1.180	(EP-1110-1-8, APP B)
Full Cost of Money Rate.	5.25	Percent per Year
Dates for Money Rate....	January to June 2008	
Annual Months Available for Dredging:		
Pipeline....	9	Months per Year
Bucket.....	10	Months per Year
Hopper.....	10	Months per Year
Current Fuel Price.....	$3.25	Per Gallon

Return

MOBIL & DEMOB COST: $234,052

Bucks Harbor Dredge - 3C

CHECKLIST FOR INPUT DATA.

BID QUANTITY	126,420 C.Y.
UNIT COST...	$15.15 PER C.Y.
EXCAV. COST.	$1,915,263
TIME.....	1.88 MONTHS

PG 1.....PROJECT -	Bucks Harbor Dredge - 3C
LOCATION -	Bucks Harbor Machiasport, ME
INVIT # -	0
DATE OF EST. -	October 15, 2007
EST. BY -	William Herland
MOB. BID ITEM # -	1
EXCAV. BID ITEM # -	2
PG 2.....TYPE OF EST. -	Planning Estimate
CONTRACTOR'S O.H. -	20.0%
CONTRACTOR'S PROFIT -	10.0%
CONTRACTOR'S BOND -	2.0%
PG 3...DREDGING AREA -	1,642,059 sf
REQ'D EXCAVATION -	75,808 cyds
PAY OVERDEPTH -	50,612 cyds
CONTRACT AMOUNT -	126,420 cyds
NOT DREDGED -	6,320 cyds
NET PAY -	120,100 cyds
NONPAY YARDAGE -	30,400 cyds
GROSS YARDAGE -	150,500 cyds
NONPAY HEIGHT -	0.5 ft overdig
TOTAL BANK HEIGHT -	2.5 ft
PG 4.....DREDGE SEL. -	4 CY CLAMSHELL
TYPE OF MATERIAL -	SAND
BUCKET SIZE -	4
BUCKET FILL FACTOR -	0.70
OPTIMUM BANK -	2
BANK FACTOR -	1.00
PG 5.....BUCKET CYCLE -	45 Seconds
OTHER FACTOR -	0.90 weather and tide
CLEANUP -	10% More Time
TIME EFFICIENCY -	60.0% of EWT
PG 6...TUG DESCRIPT. -	1000 HP Diesel--Twin Screw
PREPARE SCOW TOW -	15 min
HAUL DIST -	2 mi
SPEED TO D/A -	4 mph (30 min)
SPEED FROM D/A -	5 mph (24 min)
DUMP OR PUMPOUT -	10 min
DISENGAGE TOW -	10 min
TOW EFFICIENCY -	45 %
SCOW DESCRIPTION -	1,000 CY Split Hull Scow
USEABLE VOLUME -	60 %
% SOLIDS -	65 % (390 cy/load)

PG 7.....DREDGES -	1
SCOWS @ DREDGE -	1
TOWING VESSELS -	1
SCOWS PER TOW -	1
ADDITIONAL SCOWS -	0
TOT SCOWS ON JOB -	2
PG 8....QTRS ON DREDGE? -	NO
SURVEY BOAT? -	YES
CREW BOAT? -	YES
PG 9...SP COST/MO (1ST) -	$20,000 Monitoring
SP COST/MO (2ND-14TH) -	$0 From Sheet D\4
SPECIAL COST LS (1ST) -	$10,000 Permit
SP COST LS (2ND-14TH) -	$0 From Sheet E
PG 10....PRESENT YEAR -	2007
ECONOMIC INDEX -	7441
LAF -	1.180
INTEREST RATE -	5.250% /yr
TIME PERIOD -	January to June 2008
PIPELINE AVAILABILITY -	9 mos/yr
BUCKET AVAILABILITY -	10 mos/yr
HOPPER AVAILABILITY -	10 mos/yr
FUEL PRICE -	$3.25 /gal

EXCAVATION PRODUCTION	-	183 cy/hr (gross)
EXCAVATION EWT	-	60.0% (438 hrs/mo)
EXCAVATION TIME	-	1.88 months
HAULING PRODUCTION	-	263 cy/hr (gross)
HAULING EWT	-	45.0% (329 hrs/mo)
HAULING TIME	-	1.74 months
DREDGING TIME	-	1.88 months
EXCAVAT EWT (ADJUSTED)	-	438 hrs/mo (60.0% EWT)
HAULING EWT (ADJUSTED)	-	305 hrs/mo (41.8% EWT)
PRODUCTION (GROSS)	-	80,154 cy per month
PRODUCTION (CONTRACT)	-	63,883 pay cy per month

63,883 pay c.y. per month	UNIT COST...	$15.15	PER C.Y.	Select Dredge: 4 CY CLAMSHELL
183 c.y. per hr, 60.0% EWT-->	EXCAV TIME..	1.88	MONTHS	
263 c.y. per hr, 45.0% EWT-->	HAUL TIME...	1.74	MONTHS	

PROJECT TITLES: PG 1 of 10

Project Name.....	Bucks Harbor Dredge - 3C	Ver. 1.0
Project Location.....	Bucks Harbor Machiasport, ME	For Information, Call:
Invit. or Contr. No.....		Julie Davin
Date of Estimate.....	October 15, 2007	Ph: 509-527-7514
Estimator.....	William Herland	
Checked by.....	Chris Lindsay	
(Input Project Descriptions on Sheet A)		Goto Sheet A
Mobilization Bid Item.....	1	
Excavation Bid Item.....	2	Goto Area Factors

TYPE OF ESTIMATE PG 2 of 10

Type of Estimate.....	1	Planning Estimate
(1) Planning, (2) Bid, or (3) Mod		Estimate Descriptions

INDIRECT COSTS:

Contractor's Overhead...	20.0	Percent of contract
Contractor's Profit.....	10.0	Percent of contract
Contractor's Bond.....	2.0	Percent of contract

ESTIMATED DREDGING QUANTITY: PG 3 of 10

Non-Pay Computation Method: 1

(1) Surface Area, (2) % of Pay O.D., (3) % of Net Pay, (4) % of Gross

DREDGING AREA: 1,642,059 SQ. FT.

DREDGING PRISM:

Required....	75,808	C.Y.			
+ Pay O.D....	50,612	C.Y.			
Bid Quantity	126,420	C.Y.			
- Not Dug..	6,320	C.Y.		AVE. BANK HEIGHT:	
Net Pay	120,100	C.Y.	@	2.0	ft pay
+ Non-Pay	30,400	C.Y.	@	0.5	ft overdig
Gross Volume	150,500	C.Y.		2.5	FT. BANK HT.

63,883 pay c.y. per month	UNIT COST...	$15.15	PER C.Y.	Select Dredge: 4 CY CLAMSHELL
183 c.y. per hr, 60.0% EWT-->	EXCAV TIME..	1.88	MONTHS	
263 c.y. per hr, 45.0% EWT-->	HAUL TIME...	1.74	MONTHS	

EXCAVATION PRODUCTION WORKSHEET: PG 4 of 10

CURRENT DREDGE SELECTED: 4 CY CLAMSHELL

Type of Material..... 2 SAND

(0) Unspecified Materials, (1) Mud, (2) Clays and Less-Dense Sand, or (3) Dense Clays, Hard-Packed Sand, Blasted Rock and Boulders

PRODUCTION FACTORS:	Override	Default	Used
Bucket Size (in CY).....		4	4
Bucket Fill Factor.....		0.70	0.70
Optimum Bank (in Feet)..	2	2.5	2.0
Bank Factor.....		1.00	1.00
(based on 2.5 Ft of Bank Height)			

EXCAVATION PRODUCTION WORKSHEET: PG 5 of 10

Bucket Cycle Time..... 45 Seconds

Other Factor..... 0.90
Description..... weather and tide

Cleanup Dredging..... 10 % Additional Time
(Cleanup Factor = 0.91)

Time Efficiency.....> 60.0 % of Effective Work Time
438 Hours Per Month

HAULING PRODUCTION WORKSHEET: PG 6 of 10

Towing Cycle: 1000 HP Diesel--Twin Screw

Prepare Scow for Tow.... 15 Minutes
One-Way Haul Distance... 2 Miles
Speed to Disposal Area.. 4 Miles per hour = 30 Min
Speed from Disposal Area 5 Miles per hour = 24 Min
Dumping or Pumpout..... 10 Minutes
Disengage Scow Tow..... 10 Minutes
Average Cycle Time: 89 Minutes per Trip

Towing Time Efficiency.. 45 Percent

Scow Capacity: 1000 CY Split Hull Scow

Useable Volume..... 60 Percent
Percent Solids..... 65 Percent = 390 cys/load

63,883 pay c.y. per month	UNIT COST...	$15.15	PER C.Y.	Select Dredge
183 c.y. per hr, 60.0% EWT-->	EXCAV TIME..	1.88	MONTHS	4 CY CLAMSHELL
263 c.y. per hr, 45.0% EWT-->	HAUL TIME...	1.74	MONTHS	

EQUIPMENT MATCHING: PG 7 of 10

	Override	Assumed	Used
# of Dredges.....	0	1	1
Scows per Dredge.....	0	1	1
# of Towing Vessels.....	0	1	1
Scows per Tow.....	0	1	1

Scows with Dredges: 1 (1 Dredge(s) x 1 Scow(s) Each)
Scows with Tows: 1 (1 Tug(s) x 1 Scow(s) Each)
Additional Scows..... 0

Total Scows on Job: 2

SPECIAL LABOR & EQUIPMENT: PG 8 of 10

(1 for Yes, 0 for No)	Override	Assumed	Used
Quarters on Dredge?.....	0	NO	NO
Survey Boat?.....	1	NO	YES
Crew Boat?.....	1	NO	YES

OTHER PRICING ADJUSTMENTS: PG 9 of 10

Other Monthly Costs:

1st Input..... $20,000 Per Month
Description..... Monitoring
(For Additional Inputs Go to Sheet D\4) Goto Sheet D/4

Fixed Costs:

1st Input..... $10,000 Lump Sum
Description..... Permit
(For Additional Inputs Go to Sheet E) Goto Sheet E

(To Adjust Labor Go To Sheet DB_L) Goto Sheet DB_L

(To Adjust Equipment Go To Sheet DB_E) Goto Sheet DB_E

63,883 pay c.y. per month	UNIT COST...	$15.15	PER C.Y.	Select Dredge: 4 CY CLAMSHELL
183 c.y. per hr, 60.0% EWT-->	EXCAV TIME..	1.88	MONTHS	
263 c.y. per hr, 45.0% EWT-->	HAUL TIME...	1.74	MONTHS	

The Factors below normally will not change for every estimate.

LOCAL AREA FACTORS: PG 10 of 10

Present Year.....	2007	(Equipment Calculations)
Economic Index.....	7441	(EP-1110-1-8, APP E)
Labor Adjustment Factor.	1.180	(EP-1110-1-8, APP B)
Full Cost of Money Rate.	5.25	Percent per Year
Dates for Money Rate....	January to June 2008	
Annual Months Available for Dredging:		
Pipeline....	9	Months per Year
Bucket.....	10	Months per Year
Hopper.....	10	Months per Year
Current Fuel Price.....	$3.25	Per Gallon

Return

MOBIL & DEMOB COST: $234,052

Bucks Harbor Dredge - 3D

CHECKLIST FOR INPUT DATA.

BID QUANTITY	261,797 C.Y.
UNIT COST...	$13.62 PER C.Y.
EXCAV. COST.	$3,565,675
TIME.....	3.51 MONTHS

PG 1.....PROJECT -	Bucks Harbor Dredge - 3D	
LOCATION -	Bucks Harbor Machiasport, ME	
INVIT # -	0	
DATE OF EST. -	October 15, 2007	
EST. BY -	William Herland	
MOB. BID ITEM # -	1	
EXCAV. BID ITEM # -	2	
PG 2.....TYPE OF EST. -	Planning Estimate	
CONTRACTOR'S O.H. -	20.0%	
CONTRACTOR'S PROFIT -	10.0%	
CONTRACTOR'S BOND -	2.0%	
PG 3...DREDGING AREA -	1,777,500	sf
REQ'D EXCAVATION -	192,078	cyds
PAY OVERDEPTH -	69,719	cyds
CONTRACT AMOUNT -	261,797	cyds
NOT DREDGED -	13,090	cyds
NET PAY -	248,707	cyds
NONPAY YARDAGE -	32,900	cyds
GROSS YARDAGE -	281,607	cyds
NONPAY HEIGHT -	0.5	ft overdig
TOTAL BANK HEIGHT -	4.3	ft
PG 4.....DREDGE SEL. -	4 CY CLAMSHELL	
TYPE OF MATERIAL -	SAND	
BUCKET SIZE -	4	
BUCKET FILL FACTOR -	0.70	
OPTIMUM BANK -	2	
BANK FACTOR -	1.00	
PG 5.....BUCKET CYCLE -	45	Seconds
OTHER FACTOR -	0.90	weather and tides
CLEANUP -	10%	More Time
TIME EFFICIENCY -	60.0%	of EWT
PG 6...TUG DESCRIPT. -	1000	HP Diesel--Twin Screw
PREPARE SCOW TOW -	15	min
HAUL DIST -	2	mi
SPEED TO D/A -	4	mph (30 min)
SPEED FROM D/A -	5	mph (24 min)
DUMP OR PUMPOUT -	10	min
DISENGAGE TOW -	10	min
TOW EFFICIENCY -	45	%
SCOW DESCRIPTION -	1,000	CY Split Hull Scow
USEABLE VOLUME -	60	%
% SOLIDS -	65	% (390 cy/load)

PG 7.....DREDGES -	1
SCOWS @ DREDGE -	1
TOWING VESSELS -	1
SCOWS PER TOW -	1
ADDITIONAL SCOWS -	0
TOT SCOWS ON JOB -	2
PG 8....QTRS ON DREDGE? -	NO
SURVEY BOAT? -	YES
CREW BOAT? -	YES

PG 9...SP COST/MO (1ST) -	$20,000	Monitoring
SP COST/MO (2ND-14TH) -	$0	From Sheet D\4
SPECIAL COST LS (1ST) -	$10,000	Permit
SP COST LS (2ND-14TH) -	$0	From Sheet E
PG 10....PRESENT YEAR -	2007	
ECONOMIC INDEX -	7441	
LAF -	1.180	
INTEREST RATE -	5.250%	/yr
TIME PERIOD -	January to June 2008	
PIPELINE AVAILABILITY -	9	mos/yr
BUCKET AVAILABILITY -	10	mos/yr
HOPPER AVAILABILITY -	10	mos/yr
FUEL PRICE -	$3.25	/gal

EXCAVATION PRODUCTION -	183	cy/hr (gross)
EXCAVATION EWT -	60.0%	(438 hrs/mo)
EXCAVATION TIME -	3.51	months
HAULING PRODUCTION -	263	cy/hr (gross)
HAULING EWT -	45.0%	(329 hrs/mo)
HAULING TIME -	3.25	months
DREDGING TIME -	3.51	months
EXCAVAT EWT (ADJUSTED) -	438	hrs/mo (60.0% EWT)
HAULING EWT (ADJUSTED) -	305	hrs/mo (41.8% EWT)
PRODUCTION (GROSS) -	80,154	cy per month
PRODUCTION (CONTRACT) -	70,857	pay cy per month

70,857 pay c.y. per month	UNIT COST...	$13.62	PER C.Y.	**Select Dredge**
183 c.y. per hr, 60.0% EWT-->	EXCAV TIME..	3.51	MONTHS	4 CY CLAMSHELL
263 c.y. per hr, 45.0% EWT-->	HAUL TIME...	3.25	MONTHS	

PROJECT TITLES: PG 1 of 10

Project Name.....	Bucks Harbor Dredge - 3D
Project Location.....	Bucks Harbor Machiasport, ME
Invit. or Contr. No.....	
Date of Estimate.....	October 15, 2007
Estimator.....	William Herland
Checked by.....	Chris Lindsay

Ver. 1.0

For Information, Call:
Julie Davin
Ph: 509-527-7514

(Input Project Descriptions on Sheet A) Goto Sheet A

Mobilization Bid Item..... 1

Excavation Bid Item..... 2 Goto Area Factors

TYPE OF ESTIMATE PG 2 of 10

Type of Estimate..... 1 Planning Estimate

(1) Planning, (2) Bid, or (3) Mod Estimate Descriptions

INDIRECT COSTS:

Contractor's Overhead...	20.0	Percent of contract
Contractor's Profit.....	10.0	Percent of contract
Contractor's Bond.....	2.0	Percent of contract

ESTIMATED DREDGING QUANTITY: PG 3 of 10

Non-Pay Computation Method: 1

(1) Surface Area, (2) % of Pay O.D., (3) % of Net Pay, (4) % of Gross

DREDGING AREA: 1,777,500 SQ. FT.

DREDGING PRISM:

Required....	192,078	C.Y.		
+ Pay O.D....	69,719	C.Y.		
Bid Quantity	261,797	C.Y.		
- Not Dug..	13,090	C.Y.		AVE. BANK HEIGHT:
Net Pay	248,707	C.Y.	@	3.8 ft pay
+ Non-Pay	32,900	C.Y.	@	0.5 ft overdig
Gross Volume	281,607	C.Y.		4.3 FT. BANK HT.

70,857 pay c.y. per month	UNIT COST...	$13.62	PER C.Y.	Select Dredge: 4 CY CLAMSHELL
183 c.y. per hr, 60.0% EWT-->	EXCAV TIME..	3.51	MONTHS	
263 c.y. per hr, 45.0% EWT-->	HAUL TIME...	3.25	MONTHS	

EXCAVATION PRODUCTION WORKSHEET: PG 4 of 10

CURRENT DREDGE SELECTED: 4 CY CLAMSHELL

Type of Material..... 2 SAND

(0) Unspecified Materials, (1) Mud, (2) Clays and Less-Dense Sand, or (3) Dense Clays, Hard-Packed Sand, Blasted Rock and Boulders

PRODUCTION FACTORS:	Override	Default	Used
Bucket Size (in CY).....		4	4
Bucket Fill Factor.....		0.70	0.70
Optimum Bank (in Feet)..	2	2.5	2.0
Bank Factor.....		1.00	1.00
(based on 4.3 Ft of Bank Height)			

EXCAVATION PRODUCTION WORKSHEET: PG 5 of 10

Bucket Cycle Time..... 45 Seconds

Other Factor..... 0.90
Description..... weather and tides

Cleanup Dredging..... 10 % Additional Time
(Cleanup Factor = 0.91)

Time Efficiency.....> 60.0 % of Effective Work Time
438 Hours Per Month

HAULING PRODUCTION WORKSHEET: PG 6 of 10

Towing Cycle: 1000 HP Diesel--Twin Screw

Prepare Scow for Tow....	15	Minutes
One-Way Haul Distance...	2	Miles
Speed to Disposal Area..	4	Miles per hour = 30 Min
Speed from Disposal Area	5	Miles per hour = 24 Min
Dumping or Pumpout.....	10	Minutes
Disengage Scow Tow.....	10	Minutes
Average Cycle Time:	89	Minutes per Trip
Towing Time Efficiency..	45	Percent

Scow Capacity: 1000 CY Split Hull Scow

Useable Volume.....	60	Percent
Percent Solids.....	65	Percent = 390 cys/load

70,857 pay c.y. per month	UNIT COST...	$13.62	PER C.Y.	Select Dredge
183 c.y. per hr, 60.0% EWT-->	EXCAV TIME..	3.51	MONTHS	4 CY CLAMSHELL
263 c.y. per hr, 45.0% EWT-->	HAUL TIME...	3.25	MONTHS	

EQUIPMENT MATCHING: PG 7 of 10

	Override	Assumed	Used
# of Dredges.....	0	1	1
Scows per Dredge.....	0	1	1
# of Towing Vessels.....	0	1	1
Scows per Tow.....	0	1	1

Scows with Dredges: 1 (1 Dredge(s) x 1 Scow(s) Each)
Scows with Tows: 1 (1 Tug(s) x 1 Scow(s) Each)
Additional Scows..... 0

Total Scows on Job: 2

SPECIAL LABOR & EQUIPMENT: PG 8 of 10

(1 for Yes, 0 for No)	Override	Assumed	Used
Quarters on Dredge?.....	0	NO	NO
Survey Boat?.....	1	NO	YES
Crew Boat?.....	1	NO	YES

OTHER PRICING ADJUSTMENTS: PG 9 of 10

Other Monthly Costs:

1st Input..... $20,000 Per Month
Description..... Monitoring
(For Additional Inputs Go to Sheet D\4) Goto Sheet D/4

Fixed Costs:

1st Input..... $10,000 Lump Sum
Description..... Permit
(For Additional Inputs Go to Sheet E) Goto Sheet E

(To Adjust Labor Go To Sheet DB_L) Goto Sheet DB_L

(To Adjust Equipment Go To Sheet DB_E) Goto Sheet DB_E

70,857 pay c.y. per month	UNIT COST...	$13.62	PER C.Y.	Select Dredge: 4 CY CLAMSHELL
183 c.y. per hr, 60.0% EWT-->	EXCAV TIME..	3.51	MONTHS	
263 c.y. per hr, 45.0% EWT-->	HAUL TIME...	3.25	MONTHS	

The Factors below normally will not change for every estimate.

LOCAL AREA FACTORS: PG 10 of 10

Present Year.....	2007	(Equipment Calculations)
Economic Index.....	7441	(EP-1110-1-8, APP E)
Labor Adjustment Factor.	1.180	(EP-1110-1-8, APP B)
Full Cost of Money Rate.	5.25	Percent per Year
Dates for Money Rate....	January to June 2008	
Annual Months Available for Dredging:		
Pipeline....	9	Months per Year
Bucket.....	10	Months per Year
Hopper.....	10	Months per Year
Current Fuel Price.....	$3.25	Per Gallon

Return

MOBIL & DEMOB COST: $234,052

Bucks Harbor Dredge - 3E

CHECKLIST FOR INPUT DATA.

BID QUANTITY	88,176	C.Y.
UNIT COST...	$16.22	PER C.Y.
EXCAV. COST.	$1,430,215	
TIME.....	1.40	MONTHS

PG 1.....PROJECT -	Bucks Harbor Dredge - 3E	
LOCATION -	Bucks Harbor Machiasport, ME	
INVIT # -	0	
DATE OF EST. -	October 15, 2007	
EST. BY -	William Herland	
MOB. BID ITEM # -	1	
EXCAV. BID ITEM # -	2	
PG 2.....TYPE OF EST. -	Planning Estimate	
CONTRACTOR'S O.H. -	20.0%	
CONTRACTOR'S PROFIT -	10.0%	
CONTRACTOR'S BOND -	2.0%	
PG 3...DREDGING AREA -	1,547,193	sf
REQ'D EXCAVATION -	44,515	cyds
PAY OVERDEPTH -	43,661	cyds
CONTRACT AMOUNT -	88,176	cyds
NOT DREDGED -	4,410	cyds
NET PAY -	83,766	cyds
NONPAY YARDAGE -	28,700	cyds
GROSS YARDAGE -	112,466	cyds
NONPAY HEIGHT -	0.5	ft overdig
TOTAL BANK HEIGHT -	2.0	ft
PG 4.....DREDGE SEL. -	4 CY CLAMSHELL	
TYPE OF MATERIAL -	SAND	
BUCKET SIZE -	4	
BUCKET FILL FACTOR -	0.70	
OPTIMUM BANK -	2	
BANK FACTOR -	1.00	
PG 5.....BUCKET CYCLE -	45	Seconds
OTHER FACTOR -	0.90	weather and tides
CLEANUP -	10%	More Time
TIME EFFICIENCY -	60.0%	of EWT
PG 6...TUG DESCRIPT. -	1000	HP Diesel--Twin Screw
PREPARE SCOW TOW -	15	min
HAUL DIST -	2	mi
SPEED TO D/A -	4	mph (30 min)
SPEED FROM D/A -	5	mph (24 min)
DUMP OR PUMPOUT -	10	min
DISENGAGE TOW -	10	min
TOW EFFICIENCY -	45	%
SCOW DESCRIPTION -	1,000	CY Split Hull Scow
USEABLE VOLUME -	60	%
% SOLIDS -	65	% (390 cy/load)

PG 7.....DREDGES -	1	
SCOWS @ DREDGE -	1	
TOWING VESSELS -	1	
SCOWS PER TOW -	1	
ADDITIONAL SCOWS -	0	
TOT SCOWS ON JOB -	2	
PG 8....QTRS ON DREDGE? -	NO	
SURVEY BOAT? -	YES	
CREW BOAT? -	YES	
PG 9...SP COST/MO (1ST) -	$20,000	Monitoring
SP COST/MO (2ND-14TH) -	$0	From Sheet D\4
SPECIAL COST LS (1ST) -	$10,000	Permit
SP COST LS (2ND-14TH) -	$0	From Sheet E
PG 10....PRESENT YEAR -	2007	
ECONOMIC INDEX -	7441	
LAF -	1.180	
INTEREST RATE -	5.250%	/yr
TIME PERIOD -	January to June 2008	
PIPELINE AVAILABILITY -	9	mos/yr
BUCKET AVAILABILITY -	10	mos/yr
HOPPER AVAILABILITY -	10	mos/yr
FUEL PRICE -	$3.25	/gal

EXCAVATION PRODUCTION -	183	cy/hr (gross)
EXCAVATION EWT -	60.0%	(438 hrs/mo)
EXCAVATION TIME -	1.4	months
HAULING PRODUCTION -	263	cy/hr (gross)
HAULING EWT -	45.0%	(329 hrs/mo)
HAULING TIME -	1.3	months
DREDGING TIME -	1.4	months
EXCAVAT EWT (ADJUSTED) -	438	hrs/mo (60.0% EWT)
HAULING EWT (ADJUSTED) -	305	hrs/mo (41.8% EWT)
PRODUCTION (GROSS) -	80,154	cy per month
PRODUCTION (CONTRACT) -	59,833	pay cy per month

59,833 pay c.y. per month	UNIT COST...	$16.22	PER C.Y.	Select Dredge: 4 CY CLAMSHELL
183 c.y. per hr, 60.0% EWT-->	EXCAV TIME..	1.40	MONTHS	
263 c.y. per hr, 45.0% EWT-->	HAUL TIME...	1.30	MONTHS	

PROJECT TITLES: PG 1 of 10

Project Name..... Bucks Harbor Dredge - 3E
Project Location..... Bucks Harbor Machiasport, ME
Invit. or Contr. No.....
Date of Estimate..... October 15, 2007
Estimator..... William Herland
Checked by..... Chris Lindsay

Ver. 1.0
For Information, Call:
Julie Davin
Ph: 509-527-7514

(Input Project Descriptions on Sheet A) [Goto Sheet A]
Mobilization Bid Item..... 1
Excavation Bid Item..... 2 [Goto Area Factors]

TYPE OF ESTIMATE PG 2 of 10

Type of Estimate..... 1 Planning Estimate
(1) Planning, (2) Bid, or (3) Mod [Estimate Descriptions]

INDIRECT COSTS:

Contractor's Overhead... 20.0 Percent of contract
Contractor's Profit..... 10.0 Percent of contract

Contractor's Bond..... 2.0 Percent of contract

ESTIMATED DREDGING QUANTITY: PG 3 of 10

Non-Pay Computation Method: 1
(1) Surface Area, (2) % of Pay O.D., (3) % of Net Pay, (4) % of Gross

DREDGING AREA: 1,547,193 SQ. FT.

DREDGING PRISM:

Required....	44,515 C.Y.			
+ Pay O.D....	43,661 C.Y.			
Bid Quantity	88,176 C.Y.			
- Not Dug..	4,410 C.Y.		AVE. BANK HEIGHT:	
Net Pay	83,766 C.Y.	@	1.5	ft pay
+ Non-Pay	28,700 C.Y.	@	0.5	ft overdig
Gross Volume	112,466 C.Y.		2.0	FT. BANK HT.

59,833 pay c.y. per month	UNIT COST...	$16.22	PER C.Y.	Select Dredge: 4 CY CLAMSHELL
183 c.y. per hr, 60.0% EWT-->	EXCAV TIME..	1.40	MONTHS	
263 c.y. per hr, 45.0% EWT-->	HAUL TIME...	1.30	MONTHS	

EXCAVATION PRODUCTION WORKSHEET: PG 4 of 10

CURRENT DREDGE SELECTED: 4 CY CLAMSHELL

Type of Material..... 2 SAND

(0) Unspecified Materials, (1) Mud, (2) Clays and Less-Dense Sand, or (3) Dense Clays, Hard-Packed Sand, Blasted Rock and Boulders

PRODUCTION FACTORS:	Override	Default	Used
Bucket Size (in CY).....		4	4
Bucket Fill Factor.....		0.70	0.70
Optimum Bank (in Feet)..	2	2.5	2.0
Bank Factor.....		1.00	1.00
(based on 2.0 Ft of Bank Height)			

EXCAVATION PRODUCTION WORKSHEET: PG 5 of 10

Bucket Cycle Time..... 45 Seconds

Other Factor..... 0.90
Description..... weather and tides

Cleanup Dredging..... 10 % Additional Time
(Cleanup Factor = 0.91)

Time Efficiency.....> 60.0 % of Effective Work Time
438 Hours Per Month

HAULING PRODUCTION WORKSHEET: PG 6 of 10

Towing Cycle: 1000 HP Diesel--Twin Screw

Prepare Scow for Tow.... 15 Minutes
One-Way Haul Distance... 2 Miles
Speed to Disposal Area.. 4 Miles per hour = 30 Min
Speed from Disposal Area 5 Miles per hour = 24 Min
Dumping or Pumpout..... 10 Minutes
Disengage Scow Tow..... 10 Minutes
Average Cycle Time: 89 Minutes per Trip

Towing Time Efficiency.. 45 Percent

Scow Capacity: 1000 CY Split Hull Scow

Useable Volume..... 60 Percent
Percent Solids..... 65 Percent = 390 cys/load

59,833 pay c.y. per month	UNIT COST...	$16.22	PER C.Y.	**Select Dredge**
183 c.y. per hr, 60.0% EWT-->	EXCAV TIME..	1.40	MONTHS	4 CY CLAMSHELL
263 c.y. per hr, 45.0% EWT-->	HAUL TIME...	1.30	MONTHS	

EQUIPMENT MATCHING: PG 7 of 10

	Override	Assumed	Used
# of Dredges.....	0	1	1
Scows per Dredge.....	0	1	1
# of Towing Vessels.....	0	1	1
Scows per Tow.....	0	1	1

Scows with Dredges: 1 (1 Dredge(s) x 1 Scow(s) Each)
Scows with Tows: 1 (1 Tug(s) x 1 Scow(s) Each)
Additional Scows..... 0

Total Scows on Job: 2

SPECIAL LABOR & EQUIPMENT: PG 8 of 10

(1 for Yes, 0 for No)	Override	Assumed	Used
Quarters on Dredge?.....	0	NO	NO
Survey Boat?.....	1	NO	YES
Crew Boat?.....	1	NO	YES

OTHER PRICING ADJUSTMENTS: PG 9 of 10

Other Monthly Costs:

1st Input..... $20,000 Per Month
Description..... Monitoring
(For Additional Inputs Go to Sheet D\4) Goto Sheet D/4

Fixed Costs:

1st Input..... $10,000 Lump Sum
Description..... Permit
(For Additional Inputs Go to Sheet E) Goto Sheet E

(To Adjust Labor Go To Sheet DB_L) Goto Sheet DB_L

(To Adjust Equipment Go To Sheet DB_E) Goto Sheet DB_E

59,833 pay c.y. per month	UNIT COST...	$16.22	PER C.Y.	Select Dredge: 4 CY CLAMSHELL
183 c.y. per hr, 60.0% EWT-->	EXCAV TIME..	1.40	MONTHS	
263 c.y. per hr, 45.0% EWT-->	HAUL TIME...	1.30	MONTHS	

The Factors below normally will not change for every estimate.

LOCAL AREA FACTORS: PG 10 of 10

Present Year.....	2007	(Equipment Calculations)
Economic Index.....	7441	(EP-1110-1-8, APP E)
Labor Adjustment Factor.	1.180	(EP-1110-1-8, APP B)
Full Cost of Money Rate.	5.25	Percent per Year
Dates for Money Rate....	January to June 2008	
Annual Months Available for Dredging:		
Pipeline....	9	Months per Year
Bucket.....	10	Months per Year
Hopper.....	10	Months per Year
Current Fuel Price.....	$3.25	Per Gallon

Return

CONSTRUCTION COST ESTIMATE

DATE PREPARED: 10/15/07 | SHEET | OF

PROJECT: Bucks Harbor

LOCATION: Machiasport, MAINE

ARCHITECT ENGINEER:

BASIS FOR ESTIMATE
- [x] CODE A (No design completed)
- [ ] CODE B (Preliminary design)
- [ ] CODE C (Final design)
- [ ] OTHER (Specify)

DRAWING NO.:

ESTIMATOR: WmH

CHECKED BY:

SUMMARY	QUANTITY NO. UNITS	QUANTITY UNIT MEAS.	LABOR + Equip PER UNIT	LABOR + Equip TOTAL	MATERIAL PER UNIT	MATERIAL TOTAL	TOTAL COST
ARMOR Stone	78,231	TNS				70 -	5476170
Haul 100 Miles	78,231	TN				20 -	1,564,620
Unload - Dock on Barge	78231	TN				7 -	547,617
Barge to Site	78231	TN				9 -	704,079
Unload - Site	78231	TN				8 -	625 848
Shuffle At site	78231	TN				8 -	625,848
Set & Adjust Breakwater	78231	TN				17 -	1,329,927
							16874,109
	10,874.109					$313.37/cy	
	34,700 C.Y.						
						SAY 315/c.y.	
Production - 20 CY/hr		-		800 CY/wk			
			34,700/800 -			43 WKS	
						SAY	10 Months

ENG FORM 150
1 AUG 59

PREVIOUS EDITION MAY BE USED

GPO : 1985 O - 467-225

Appendix B

Geologic Assessment for Dredging

1.0 GEOLOGIC ASSESSMENT FOR DREDGING

1.1 Local Geology

Gray to maroon, highly metamorphosed shales and siltstones of the Devonian-age Eastport Formation underlie the Bucks Neck area of Machias Bay, with some bedded tuffs (Gates, 1981). Differences among the few fossils that have been found in these rocks suggest that the Lower Paleozoic rocks of the mid-coastal area were parts of oceanic islands geographically isolated from rocks of similar age in northern Maine, and in eastern Maine and neighboring New Brunswick that were subducted against North America (Marvinney, 2005). Where exposed and not near faults, these rock are extremely hard and fracture along bedding planes.

During the end of the last Ice Age, when the great ice sheet was melting, its margin had reached the present coast of Maine about 16,000 years ago. The mass of ice had caused the earth's crust to bend downward, and as the ice margin retreated, the ocean flooded the down warped areas when they became ice free. Into this glacial-marine environment, glacial streams deposited coarse to fine materials. The fine particles such as fine sand, silt, and clay were deposited as a blanket of mud away from and over the coarser materials or bedrock, varying in thickness from a veneer to 200+ feet (Maine Geological Survey, 2005). Bedding varies from thin to massive, overlying older till deposits or bedrock. In the Machiasport area, glacial overburden units locally consist of boulder-rich outwash gravels overlying 50+ feet thick sequences of Presumpscot Formation silts and clays (ABB, 1997). The Presumpscot Formation comprises most of the surface material in the Bucks Harbor area, with the exception of the Bucks Neck northern shore (Borns, 1974a, b). At Howard Cove 1.9 miles south of Bucks Neck, the Presumpscot Formation is underlain by a sand unit of variable thickness.

The bottom type north of Bucks Neck is sandy, and the region south of Bucks Neck is characterized as muddy, containing material finer than sand likely containing fine material from the Presumpscot Formation, (Barnhardt and others, 1996, Timson, 1976a and b, Borns, 1974a and b).

1.2 Previous Investigations for the Eight Foot Anchorage Improvement

The United States Army Corps of Engineers New England Division (USACE) pushed 68 probes across and outside the project area using two men in a boat (USACE, 1974a). Seven probes required using a 12-lb hammer to achieve the desired depth of penetration. Five of the seven probes were near Sprague Block Wharf. Two others were in the middle of the project area. Only two probes encountered refusal: P-64 encountered refusal at -9.2 ft MLW located 80 feet NE of the pier (within the project area), and P-68 at -12.4 ft MLW located 225 feet SE of the pier (outside the project area). The anchorage was dredged to 8-ft between Bucks Neck and Bucks Head in 1974, removing 1 to 4 feet of sediment (USACE, 1974b, 1971).

Between 1974 and 1979, less than two feet of sediment re-filled the 1974 dredge area based on historic bathymetry data (USACE, 1974b, 1976, 1979).

1.3 Recent Investigations and Conclusions

Under USACE contract, GEI Consultants, Inc. pushed 68 probes in the proposed new anchorage area in 2004 (GEI, 2004). When the probe could not be manually pushed further, a 300-lb hammer was used to advance the probe to the desired depth (-10 to -11 ft MLW). No probes encountered refusal. Two of the probes encountered high plasticity soils in the area previously mapped as having a muddy bottom (Barnhardt and other, 1996).

Under USACE contract, Woods Hole Group collected 12 samples for grain size and bulk chemistry using the (Woods Hole Group, 2004). Grain size analysis showed clays and silty clays near the southern shore of Bucks Neck (7 samples), with silty sands and sand near the northern shore (five samples).

Subsurface characterizations conducted by USACE and others indicate that 3% of 1980's era probes and 0% of 2004-era probes encountered refusal. Due to expansion happening north/away from exposed ledge and the site's geology, bedrock-related refusals are not expected, and boulders are not likely. These data also indicate that the sediments near the southern shore of Bucks Neck are muddy bottom deposits likely related to the Presumpscot Formation silts and clays. Sandy materials are present in the northern part of the project area, and likely represent younger outwash deposits. Hydraulic dredging may be appropriate for the clays, silts, and sands underlying the project area.

2.0 REFERENCES

ABB Environmental Services, Inc. 1997, Engineering Evaluation of Contamination, Bucks Harbor Former Air Force Radar Tracking Station, Machiasport, Maine, ABB Environmental Services, Inc., Portland, Maine, 76 p.

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Gates, O. 1981. Bedrock Geology of the Machias, Columbia Falls, and Great Wass Island Quadrangles: Maine Geological Survey, Department of Conservation, Open File No. 81-11.

GEI, 2004. Geotechnical Explorations, Section 107 Navigation Improvement Study – Feasibility Phase, Bucks Harbor, Machiasport, Maine. Prepared for the US Army Corps of Engineers New England District by GEI Consultants, 4021 Main Street, Winchester, MA.

Maine Geological Survey, 2005. A General Introduction to the Presumpscot Formation - Maine's "Blue Clay". Available at: http://www.maine.gov/doc/nrimc/mgs/explore/surficial/facts/oct00.htm

Marvinney, R.G., 2005. Bedrock Geologic History of Maine. Available at: http://www.maine.gov/doc/nrimc/mgs/explore/bedrock/facts/geol-hist.htm#Lower2

Timson, B.S., 1976a. Coastal Marine Geologic Environments of the Machias Quadrangle, Maine. Department of Conservation Maine Geological Survey Open-File Report 76-105.

Timson, B.S., 1976b. Coastal Marine Geologic Environments of the Machias Bay Quadrangle, Maine. Department of Conservation Maine Geological Survey Open-File Report 76-106.

United States Army Corps of Engineers (USACE), 1979. Condition Survey, 8-ft Anchorage, Bucks Harbor, Machiasport, Maine. Drawing No. 2043 D-8-2. Prepared by Department of the Army Corps of Engineers, New England Division.

USACE, 1976. Condition Survey, 8-ft Anchorage, Bucks Harbor, Machiasport, Maine. Drawing No. 2043 D-8-2. Prepared by Department of the Army Corps of Engineers, New England Division.

USACE, 1974a. Improvement Dredging, 8-ft Anchorage, Bucks Harbor, Machiasport, Maine. Drawing No. 1982 D-8-2. Prepared by Department of the Army Corps of Engineers, New England Division.

USACE, 1974b. After Dredging Survey, 8-ft Anchorage, Bucks Harbor, Machiasport, Maine. Drawing No. 2003 D-8-2. Prepared by Department of the Army Corps of Engineers, New England Division.

USACE, 1971. Report Survey, Bucks Harbor, Machiasport, Maine. Plate 2, Drawing No. 1918 D-8-2. Prepared by Department of the Army Corps of Engineers, New England Division.

Woods Hole Group, 2004. Environmental Assessment, Sediment Sampling and Testing for Buck's Harbor, Machiasport, Maine. Prepared for the US Army Corps of Engineers New England District by Woods Hole Group Environmental Laboratories, 375 Paramount Drive, Suite 2, Raynham, MA.

Appendix C

Economic Evaluation

NAVIGATION IMPROVEMENT
FEASIBILITY STUDY
BUCKS HARBOR
MACHIASPORT, MAINE

ECONOMIC APPENDIX

Department of the Army
New England District, Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Table of Contents

Methodology

The purpose of this assessment is to evaluate the benefit of navigation improvement in Bucks Harbor, Machiasport, Maine. Benefit classification is from the National Economic Development Account (NED). Regional economic benefit is not developed in this appendix. Benefit and costs are made comparable by conversion to average annual equivalents. An interest rate of 4-7/8% as specified in the Federal Register is to be used by Federal agencies in the formulation and evaluation of water and land resource plans for the period 1 October 2007 to 30 September 2008. All cost and benefits are stated at the current price level. The period of analysis is 50 years. The analysis of cost and benefit follows standard U.S. Army Corps of Engineers procedures. The reference document used in the benefit estimation process is ER 1105-2-100, 22 April 2000, Appendix E, Section II, Navigation, E-11, NED Benefit Evaluation Procedure: Commercial Fishing.

A plan is considered economically feasible if annualized benefit divided by annualized cost is greater than or equal to one. Net benefit, or plan benefit minus plan cost must be greater than or equal to zero. The plan with the largest net benefit is identified and labeled the NED plan.

Study Area

The town of Machiasport is located in northeastern coastal Maine approximately 2 ½ miles below the town of Machias and north of the Machias River. It is in Washington County approximately 70 miles east of Ellsworth, and 25 miles west of Lubec, Maine. Bucks Harbor is 8 miles south of the center of Machiasport on the west side of Machias Bay. The Corps of Engineers completed a navigation improvement project in Bucks Harbor in July 1974. The project consists of 11 acres of anchorage 8 feet deep extending from the southerly side of Buck's Neck about 1450 feet along the westerly side of the harbor, southeasterly toward Buck's Head.

Navigation Problem

The commercial fishing fleet consists of approximately 65 vessels mostly engaged in lobster fishing. The Atlantic Salmon Company operates an aquaculture operation raising salmon. They utilize the largest boats in the harbor making daily trips to their salmon pens. The fleet is experiencing tidal delays and groundings at low tide. Crowding conditions delay vessels transiting the anchorage area. The close proximity of moored vessels is resulting in collision damages as they swing about their moorings. The Federal anchorage area has not been maintenance dredged since its construction in 1974 and has shoaled in some spots. Some vessels are moored outside the Federal anchorage area in shallower water. Vessels are also experiencing damages from waves during storm events.

Status of the Lobster Resource

Over the last 14 years lobster landings in the state Maine have been increasing with a record catch being recorded in 2004. Pounds landed and their dollar value is shown in Table 1.

Table 1. American Lobster Landings, Maine, 1992-2005.

Year	Pounds (000)	$ (000)	Price/lb
1992	26,830.4	71,822.7	$2.68
1993	29,926.5	73,863.4	$2.47
1994	38,948.9	100,936.7	$2.59
1995	37,208.3	101,893.2	$2.74
1996	36,083.4	106,980.6	$2.96
1997	47,023.3	138,292.4	$2.94
1998	47,036.8	137,189.3	$2.92
1999	53,494.4	184,614.1	$3.45
2000	57,215.4	187,714.8	$3.28
2001	48,617.7	153,982.3	$3.17
2002	63,625.7	210,950.0	$3.32
2003	54,967.2	205,706.7	$3.74
2004	71,160.9	286,736.2	$4.03
2005	67,348.7	311,575.0	$4.63

The lobster catch in Maine for the period 1950 to 2005 can be found at http://www.maine.gov/dmr/commercialfishing/lobster.mht

Lobster landings for Washington County, of which Bucks Harbor is a part,, are shown in Table 2. The record catch for Washington County was in 2005 at 9,098,500 pounds fetching a value of $43,335,000, or $4.76 per pound. Lobster landings by county can also be found at the website referenced above.

Table 2. American Lobster Landings, Washington County, Maine, 1992-2005.

Year	Pounds (000)	$ (000)	Price/lb
1992	1,998.6	5,509.8	$2.76
1993	2,241.1	6,189.1	$2.76
1994	2,711.4	7,391.7	$2.73
1995	2,538.3	7,502.9	$2.96
1996	3,377.5	10,946.8	$3.24
1997	3,954.1	11,960.0	$3.02
1998	4,397.2	14,254.9	$3.24
1999	3,889.2	14,564.3	$3.74
2000	4,789.0	18,363.9	$3.83
2001	6,948.8	23,047.7	$3.32
2002	7,499.2	25,857.1	$3.45
2003	6,872.7	26,651.8	$3.88
2004	7,859.8	32,430.8	$4.13
2005	9,098.5	43,335.0	$4.76

Improvement Plans

There are four basic plans with some variations. Alternative 1 is no action or the without project condition. Alternative 2 is to relocate the fleet to Jonesport Harbor. Alternative 3 is to expand the dimensions of the current Federal anchorage area. This plan has 5 options. Alternative 3a involves creating approximately 13.5 acres of 6-foot anchorage, 4.1 acres of 8-foot channel, and 9.6 acres of 8-foot anchorage in the harbor. Alternative 3b involves creating approximately 23.1 acres of 6-foot anchorage and 4.1 acres of 6-foot channel. Alternative 3c involves creating approximately 23.1 acres of 8-foot anchorage and 4.1 acres of 8-foot channel. Alternative 3d involves creating approximately 23.1 acres of 10-foot anchorage and 4.1 acres of 10-foot channel. Alternative 3e is essentially the same as 3a but with a different channel alignment. Alternative 4 is to construct a breakwater with two options. Alternative 4a involves the creation of a 415-foot breakwater that extends north from the mainland and a 575-foot breakwater that extends south from Bar Island. Alternative 4b involves the creation of a 545-foot breakwater that extends south from Bar Island.

Alternative 2 would have relocated the fishing fleet to a nearby port. This plan would have imposed additional travel time on the fishermen of approximately two hours per trip. It is not acceptable to the fishermen because the additional travel time that would increase the work day by two hours resulting in an estimated $636,000 in additional labor and fuel cost for the fleet to harvest the catch. Combined with added

dredging cost at Jonesport Harbor, it was felt that this plan would not be economically viable and dropped from further analysis.

Improvement Plans Benefit

Project benefit is the difference in fish harvesting cost between the with and without project conditions. It is measured in terms of a reduction in damage to fishing vessels and a reduction in delays. Currently there are approximately 65 fishing vessels on the harbormaster's list as moored in the harbor. These vessels are experiencing damages at mooring from collisions during storm events. They are also experiencing delays due to crowded conditions in the anchorage area. As there is no established channel, vessels have to weave their way around moored vessels when transiting the anchorage area. Delays are also experienced by some vessels due to insufficient depth at low tide. With project improvement additional anchorage area is provided for lobster cars, floats, and other equipment need to conduct commercial fishing operations. This has the effect of creating space for the equivalence of 94 fishing vessels.

Questionnaires were mailed out to the fishermen on the harbormaster's original mooring list, which had 55 vessels on it at the time. Thirty-two of the vessels on the mooring list responded for a response rate of approximately 49 percent. The sample and mooring list were stratified into 3 class sizes: vessels under 30 feet in length, vessels greater than 30 feet in length, but less than 40 feet, and vessels greater than 40 feet in length.

Delays and damages are calculated annually per boat and then weighted to represent all boats in that size class. The delays and damages are then summed over the entire sample. The labor component of congestion delay is the product of the number of trips, the reported congestion delay per trip, the crew size and the value per hour of labor. The fuel component of congestion delay is the product of the number of trips, the reported congestion delay per trip, the number of gallons consumed per hour, and the price per gallon.

The labor component of tidal delay is the product of the number of trips, the calculated tidal delay per trip, the crew size and the value per hour of labor. The fuel component of tidal delay is the product of the number of trips, the calculated tidal delay per trip discussed below, the number of gallons consumed per hour, and the price per gallon. Delays are calculated assuming each vessel needs 1 foot of under keel clearance. The controlling depth is –8 feet in the Federal anchorage area and –4 feet in the area outside the anchorage. Tidal height required is the sum of the loaded draft and under keel clearance minus the channel depth (5.5'+1'-4'). This yields a required tidal height of 2.5' and a wait of 3.5 hours (rounding to the nearest foot). Average delay is calculated using the relationship 3.5/12.4 x 3.5/2 =0.13 hours.

Reported damages to vessels from waves, groundings and collisions were weighted and summed to arrive at the annual damages for the commercial fleet. The surveys results weighted by fleet size are shown in the column labeled Without Project in Table 3.

Table 3
Project Benefit ($000)
Bucks Harbor
Machiasport, ME

	Without Project	With Project				Benefit			
		Channel Depth, feet			Breakwater	Channel Depth, feet			Breakwater
		6	8	10		6	8	10	
Congestion									
Labor	84.6	21.1	21.1	21.1	84.6	63.4	63.4	63.4	0.0
Fuel	36.6	9.2	9.2	9.2	36.6	27.5	27.5	27.5	0.0
Total Congestion	121.2	30.3	30.3	30.3	121.2	90.9	90.9	90.9	0.0
Tidal Delays									
Labor	29.3	6.4	0.0	0.0	29.3	22.9	29.3	29.3	0.0
Fuel	31.9	5.4	0.0	0.0	31.9	26.5	31.9	31.9	0.0
Total Tidal Delay	61.1	11.7	0.0	0.0	61.1	49.4	61.1	61.1	0.0
Damages									
Waves	65.4	65.4	65.4	65.4	3.3	0.0	0.0	0.0	62.1
Groundings	36.1	9.0	9.0	9.0	36.1	27.1	27.1	27.1	0.0
Collisions	17.6	4.4	4.4	4.4	17.6	13.2	13.2	13.2	0.0
Total Damages	119.1	78.8	78.8	78.8	57.0	40.3	40.3	40.3	62.1
Total Cost	301.4	120.8	109.1	109.1	239.3	180.6	192.3	192.3	62.1

Providing additional anchorage area as well as providing a designated navigation channel will reduce congestion and tidal delay for the existing commercial fleet. It should also reduce damages experienced by the fleet from vessels colliding at mooring and while underway. The damage resulting from groundings should also be reduced. It is estimated that with navigation improvements congestion and tidal delays will be reduced by 75 %, and damages from groundings and collisions will also be reduced by 75 %. Damage from waves should remain the same for the dredging depths under consideration. This damage is shown in the with project column in Table 3.

Improvement Plans Cost

The estimated cost of alternatives is show in Table 4.

Table 4
Project Cost
Bucks Harbor
Machiasport, ME

	Alternative						
	3a	3b	3c	3d	3e	4a	4b
Construction	0.0	0.0	0.0	0.0	0.0	10,930.5	11,088.0
Mob & Demob	234.1	234.1	234.1	234.1	234.1	0.0	0.0
Dredging							
Ordinary	883.8	718.3	1,379.8	3,084.3	870.5	0.0	0.0
Boulders	40.5	40.5	40.5	40.5	40.5	0.0	0.0
Total	924.3	758.8	1,420.3	3,124.8	911.0	0.0	0.0
E&D	58.8	84.3	70.6	85.3	59.8	98.0	98.0
S&A	64.2	92.0	77.0	93.1	65.3	160.0	160.0
Total First Cost	1,281.4	1,169.2	1,802.0	3,537.3	1,270.2	11,188.5	11,346.0
IDC	1.3	0.0	3.7	18.0	0.0	206.8	209.7
Construction Period	1.5	1.0	2.0	3.5	1.0	10.0	10.0
Total Investment Cost ($000)	1,282.7	1,169.2	1,805.7	3,555.2	1,270.2	11,395.3	11,555.7
Annual Investment Cost ($000)	68.9	62.8	97.0	191.0	68.2	612.2	620.8
Annual O&M	16.7	16.7	16.7	16.7	16.7	0.0	0.0
Annual Project Cost ($000)	85.6	79.5	113.7	207.7	84.9	612.2	620.8

E & D and S & A for Plans 3a, 3b, 3c, 3d, and 3e are reduced by 60%, 86%, 72%, 87%, and 61%, respectively to account for improvement quantities dredged only. Mob & Demob cost is not adjusted to reflect maintenance dredging but is attributed entirely to the improvement project.

O & M cost for dredging is estimated at $1,297,100 occurring in year 30 of the period of analysis. Discounted to the present and annualized over a period of 50 years, this results in an annual cost of $16,700.

Improvement Plans Justification

A comparison of plan benefit and cost is shown in Table 5.

Table 5
Project Benefit-Cost Summary
Bucks Harbor
Machiasport, Me

	Alternatives						
	3a	3b	3c	3d	3e	4a	4b
Annual Benefit	192.3	180.6	192.3	192.3	192.3	62.1	62.1
Annual Cost	85.6	79.5	113.7	207.7	84.9	612.2	620.8
Net Benefit	106.7	101.0	78.6	-15.4	107.4	-550.1	-558.7
Benefit/Cost Ratio	2.2	2.3	1.7	0.9	2.3	0.1	0.1

The improvement plan with the largest net benefit is Plan 3e, which consists of dredging 13.5 acres of 6 foot anchorage, 4.1 acres of 8 foot channel, and 9.6 acres of 8 foot anchorage. The annual benefit for this plan is $192,300 and the annual cost is estimated to be $84,900. This results in an annual net benefit of $107,400, which is only slightly higher than the net benefit for plan 3a. Alternative 3e is the NED plan. The benefit to cost ratio for Alternative 3e is 2.3. The only difference between Alternatives 3a and 3e is the routing of the channel. For plan 3e the channel is routed along the south side of the harbor, instead of the middle as in plan 3a. The total dredging cost for Plan 3e is estimated to be $1,495,100 but a portion of this cost is for maintenance of the existing Federal project. The improvement portion cost is $1,270,200. For a 50-year project life and an interest rate of 4 7/8 %, the capital recovery factor is 0.05372 resulting in an annual project cost of $84,900.

Appendix D

Real Estate Plan

NEW ENGLAND DISTRICT
U.S. ARMY CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REAL ESTATE PLAN
BUCKS HARBOR NAVIGATION IMPROVEMENT
MACHIASPORT, MAINE

PREPARED BY:

A. MARY DUNN
STAFF APPRAISER

AUGUST 2007

Bucks Harbor Navigation Improvement Plan, Machiasport, Maine. Section 107 of the River and Harbor Act of 1960, as amended.

1.PURPOSE: The purpose of this plan is to provide an estimate of the real estate requirements involved in the completion of the proposed project. The purpose of the proposed navigation improvement project at Bucks Harbor, Machiasport, Maine, is to deepen the anchorage area and channel at Bucks Harbor. The project extends through both the Inner and Outer Harbors. The Inner Harbor is mainly used as a clam harvesting resource and to moor vessels during severe storm conditions. The Outer Harbor is used for commercial fleets (fishing). Bucks Harbor experiences a mean tidal range of 12.5 feet and a spring tidal range of 14.4 feet. Depths in the harbor gradually deepen from about 5 feet at the fish pier to 30 feet at the entrance of Machias Bay. The problems that were noted at the harbor are overcrowding due to a lack of deep water anchorage, no clear access channel as the area originally provided for a fairway has been consumed by moorings due to a great demand, and exposure to hazardous storm conditions entering the harbor from Machias Bay. Due to the overcrowded conditions, and in some areas a lack of adequate depths, storm wind and waves create numerous problems. Boats wing about their moorings oftentimes striking other vessels, or if they are grounded, the waves cause damages to the vessel itself and/or the equipment on board. These navigation problems create damages to vessels and delays to the fleet, thus greatly inhibiting their efficiency of operation and restricting potential growth of the fleet. Thus, to maintain the solvency of the existing fleet, and any hope for growth of the fishing fleet, as well as investment in improvements of existing facilities, improvements to the existing navigation conditions must be undertaken.

The dredging of approximately 30,000 cubic yards (cy) of material is required to provide sufficient deep water mooring space for the expanding commercial fishing fleet, reduce damages, congestion related delays and tidal delays currently experienced by the fleet. The dredging would create 4 acres at 8 foot anchorage, 4 acres at 6 foot anchorage at Mean Low Water (MLW), and 80 foot wide by 8 foot deep access channel running from deep water to the northwest end of the anchorages.

The proposed disposal site for the dredged material is an open water site previously used in the construction of the original navigation project.

The work is expected to take three months to complete.

2.a. PROJECT AREA DESCRIPTION: Bucks Harbor is used solely for commercial purposes. It supports a large commercial fleet of over 60 vessels, which moor in the harbor, and transient boats that also utilize the harbor and fishing pier. There are no rental slips or onshore facilities servicing recreational boaters in the harbor. Bucks Harbor is located about 8 miles south of Machiasport on the west side of Machias Bay, in the town of Machiasport. The harbor lies 70 miles east of Ellsworth, Maine and is situated along U.S. Route 1, about 25 miles west of Lubec, Maine and the Canadian border. The harbor is bordered by mainland to the south and west, and by mudflats, mainland and Bar Island to the north. Access to Machias Bay is from the east. Onshore

facilities are minimal in the harbor. There is one private dock along the south side of the harbor and a public commercial pier extends into the harbor from Bucks Neck. The town dock, managed by the Bucks Harbor Fisherman's Cooperative, handles the offloading of most of the catch landed by the commercial fishing fleet. The primary catch landed at the fish pier is lobster, quahogs, clams, and mussels. The current mooring list includes 55 vessels. Boats range in length from 22 to 55 feet with drafts from 2.5 to greater than 6 feet.

In order to improve the management the management of the harbor and, thus, improve the operating efficiency of the commercial fishing fleet, the town has improved and expanded its shoreline access and support facilities for the commercial fishing operation. The town also received a Coastal Zone Management grant to study waterfront planning, including shoreline ordinances and zoning, identification, improvement and/or construction of possible public access points in the harbor for a new public pier and boat ramp. Both the State of Maine and town of Machiasport have made improvements to the harbor for navigation purposes. Also, in 1972 a Federal navigation project for Bucks Harbor consisting of 11 acres of anchorage dredged to 8 feet below MLW was approved; the project was constructed in 1974 and provided approximately 13 acres, allowing for a maneuvering fairway for access through the anchorage.

When the navigational improvement project is completed, the existing fleet will experience a much greater operating efficiency, making them more competitive. The project would ease navigational access and anchorage and provide a safe mooring for boats during storms.

2.b. RECOMMENDED PLAN:

The recommended plan of improvement would provide approximately 4 acres of 8 foot anchorage and 4 acres of 6 foot anchorage at MLW, and an 80 foot wide by 8 foot deep access channel running from deep water to the northwest end of the anchorages. Construction of the proposed navigation improvement would require the removal of approximately 30,000 cubic yards of ordinary material. The proposed disposal site for the dredged material is an open water site previously used in the construction of the original navigation project. The alignment of the new anchorage areas and channel considered factors, such as natural deep-water areas, exposure to storm conditions, and access to the fisherman's Coop pier.

The additional anchorage areas would provide sufficient deep water mooring space for the expanding commercial fishing fleet, reduce damages, congestion related delays and tidal delays currently experienced by the fleet.

The work for all of the alternatives will be in the water with access from the town pier for the work boat. The disposal site for the dredging material is in the water.

The following various alternatives were considered:

Alternative 1 - No Action

Not improving the navigation situation in any way would result in a continuation of existing difficulties. Overcrowding in the anchorage areas would persist and the damages to vessels associated with the overcrowding would continue. This option is not acceptable to the local interests.

Alternative 2 – Fleet Relocation

The relocation of the Buck's Harbor fleet was considered to alleviate overcrowding conditions in the project area. Options available for relocation include moving the fleet to Jonesport or Beals Harbor; the distances from Bucks Harbor are 5 to 10 miles, respectively. This alternative was determined to be unacceptable because of the increased distance to the fishing grounds as well as the lack of space at these harbors to accommodate the additional vessels from Bucks Harbor.

Alternative 3 – Project Expansion

The addition of a designated navigation channel and expanding the anchorage area was considered in order to alleviate overcrowding conditions in the harbor. The following sub-alternatives were included in our analysis. The calculated quantities are based on 1 foot of allowable overdepth dredging and a 1:3 side slope construction. Channel area and quantity calculation ns also include a 0.7 acre turning basin at its end.

Alternative 3a – This alternative would create approximately 7.5 acres of 6' anchorage, 4.4 acres of 8' channel, and 12.1 acres of 8' anchorage in the harbor. This would require the removal of approximately 11,200 cy, 12,800 cy, and 41,700 cy, respectively.

Alternative 3b – This alternative would create approximately 19.6 acres of 6' anchorage and 4.4 acres of 6' channel. This would require the removal of approximately 66,100 cy and 14,500 cy, respectively.

Alternative 3c - This alternative would create approximately 19.6 acres of 8' anchorage and 4.4 acres of 8' channel. This would require the removal of approximately 66,100 cy and 14,500 cy, respectively.

Alternative 3d – This alternative would create 19.6 acres of 10' anchorage and 4.4 acres of 10' channel. This would require the removal of approximately 135,000 cy and 31,400 cy, respectively.

Alternative 3e – This sub-alternative is similar to 3aa but, in this case, the Channel is routed along the south side of the harbor rather than through the middle. It involves the creation of approximately 7.5 acres of 6' anchorage, 4.4 acres of 8' channel, and 12.1 acres of 8' anchorage in the harbor. This would require the removal of approximately 11,200 cy, 21,200 cy, and 37,100 cy, respectively.

Alternative 4 – Project Expansion and Breakwater

The addition of the channel, expansion of the anchorage areas, and the creation of a breakwater were also considered in order to alleviate overcrowding conditions in the harbor. The creation of a breakwater would add additional anchorage space in the form of deep water moorings to the project area. Sub-alternatives 3a-3e were considered in conjunction with the following breakwater sub-alternatives:

Alternative 4a – This alternative would create a 41.5' breakwater to the south and a 575' breakwater to the north (Bar Island). Approximately 13,000 cy and 21,700 cy of stone would be required for the south and north breakwaters, respectively. An additional 150,000 SF of space for an additional 6 vessels would be provided.

Alternative 4b – This alternative would create a 545' breakwater to the north (Bar Island). Approximately 35,200 cy of stone would be required for the breakwater. An additional 228,000 SF of space for an additional 10 vessels would be provided.

The preferred alternative appears to be Alternative 3e, however, there is no real estate required for this project, therefore, there are no changes to the report even if the preferred alternative changes.

2.c. OWNERSHIPS: All of the work will be done in the water and the open sea will be used as a disposal site for the dredged material. Local officials and harbor users have expressed a desire to have the placement of the material to be removed through dredging at the open water site previously used in the construction of the original Bucks Harbor improvement project in 1974. This site is located about 2 miles from Bucks Harbor in Machias Bay. Access for the work boat will be from the town pier.

3. DESCRIPTION OF NON-FEDERAL SPONSOR'S EXISTING OWNERSHIP:

The land where the town pier is located and the submerged lands to the mean low water mark are owned by the town of Machiasport.

4. RECOMMENDED ESTATES: No real estate is required for this project since the work will all be done in the water and the open sea will be used as a disposal site for the dredged material.

5. EXISTING FEDERAL PROJECTS: There are no current projects in the project area.

6. EXISTING FEDERAL OWNERSHIPS: There are no federally owned lands in the project area.

7. NAVIGATION SERVITUDE: Navigation servitude applies since the purpose of this project is to deepen the anchorage area and channel at Bucks Harbor. All construction, operation, and maintenance are within the navigation servitude and the navigation servitude will be exercised.

8. REAL ESTATE MAPPING: No real estate maps are required, since no real estate is required for this project. The maps showing the various alternatives are attached.

9. INDUCED FLOODING: No induced flooding is anticipated due to the proposed project.

10. BASELINE COST ESTIMATE FOR REAL ESTATE:

Fee Value: No fee acquisition is required.

Permanent Easement Value: No permanent easement areas will be required.

Temporary Easement Value: No temporary easements will be required.

Administrative Costs: There are no administrative costs associated with this project.

11. PUBLIC LAW 91-646 RELOCATIONS: No potential Public Law 91-646 relocations are required in connection with this project.

12. MINERAL/TIMBER ACTIVITY: There is no present or anticipated mineral or timber harvesting activity in the vicinity of the project that may affect the operation thereof.

13. ASSESSMENT OF NON-FEDERAL SPONSOR'S REAL ESTATE ACQUISITION CAPABILITIES: The non-federal sponsor is the Town of Machiasport. However, since no lands are being acquired, the *Assessment of Non-Federal Sponsor's Real Estate Acquisition Capability* is not required.

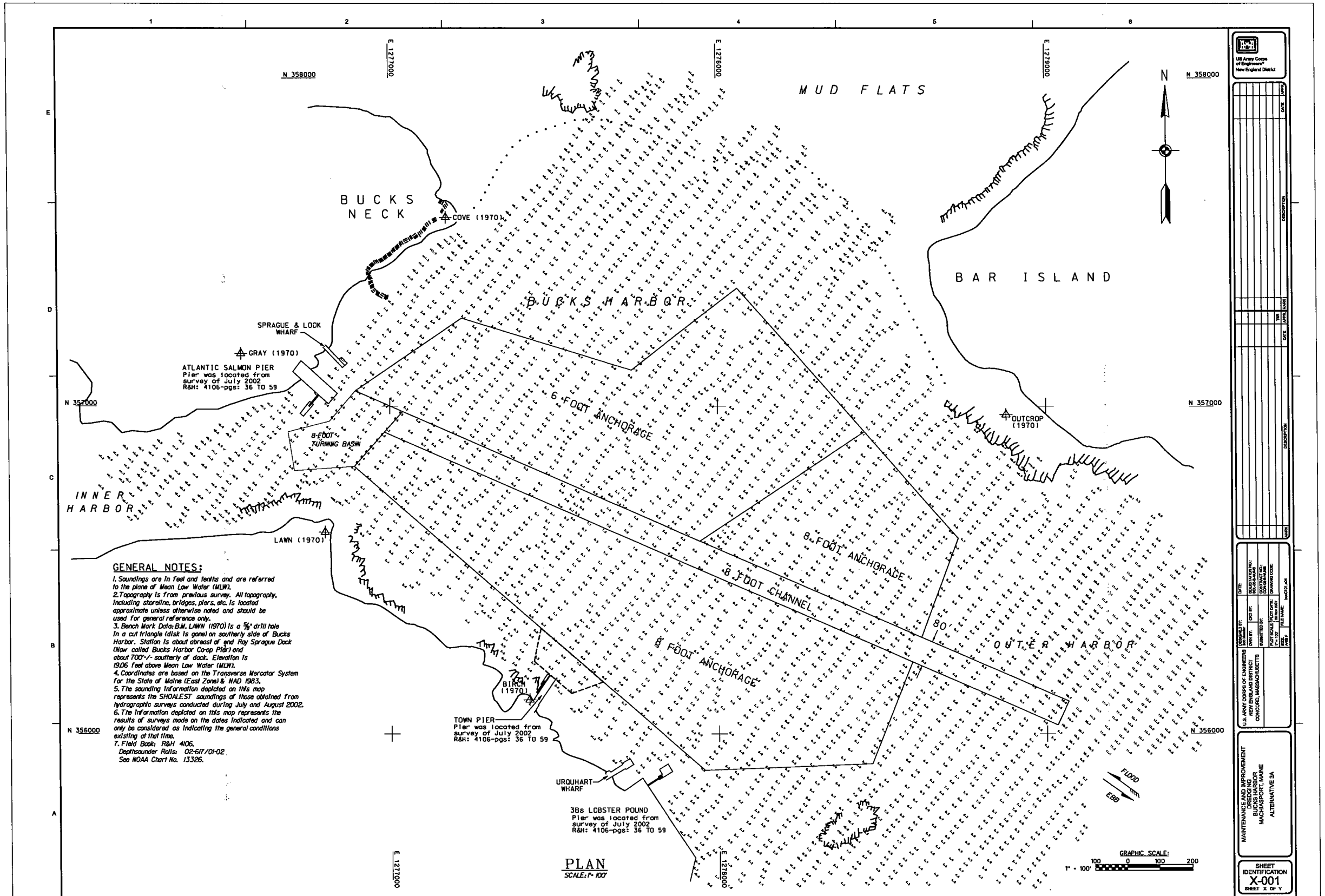
14. ZONING CHANGES: No zoning changes are proposed in lieu of, or to facilitate, real estate acquisitions.

15. ACQUISITION SCHEDULE: There is no real estate being acquired for this project, since all the work will be in the water and the disposal site is also in the water.

16. FACILITIES AND UTILITIES RELOATIONS: The proposed project will not require any utility and/or facility relocations.

17. HAZARDOUS, TOXIC, AND READIOACTIVE WASTE: There is no known on-site contamination.

18. LANDOWNER SENTIMENT: The state of Maine, local officials and harbor users are supportive of the project



GENERAL NOTES:

1. Soundings are in feet and tenths and are referred to the plane of Mean Low Water (MLW).
2. Topography is from previous survey. All topography, including shoreline, bridges, piers, etc. is located approximate unless otherwise noted and should be used for general reference only.
3. Bench Mark Data: B.M. LAWN (1970) is a ⅝" drill hole in a cut triangle (disk is gone) on southerly side of Bucks Harbor. Station is about abreast of end Roy Sprague Dock (Now called Bucks Harbor Co-op Pier) and about 700'+/- southerly of dock. Elevation is 19.06 feet above Mean Low Water (MLW).
4. Coordinates are based on the Transverse Mercator System for the State of Maine (East Zone) & NAD 1983.
5. The sounding information depicted on this map represents the SHOALEST soundings of those obtained from hydrographic surveys conducted during July and August 2002.
6. The information depicted on this map represents the results of surveys made on the dates indicated and can only be considered as indicating the general conditions existing at that time.
7. Field Book: R&H 4106.
   Depthsounder Ratio: 02-617/01-02
   See NOAA Chart No. 13326.

PLAN

SCALE: 1" = 100'

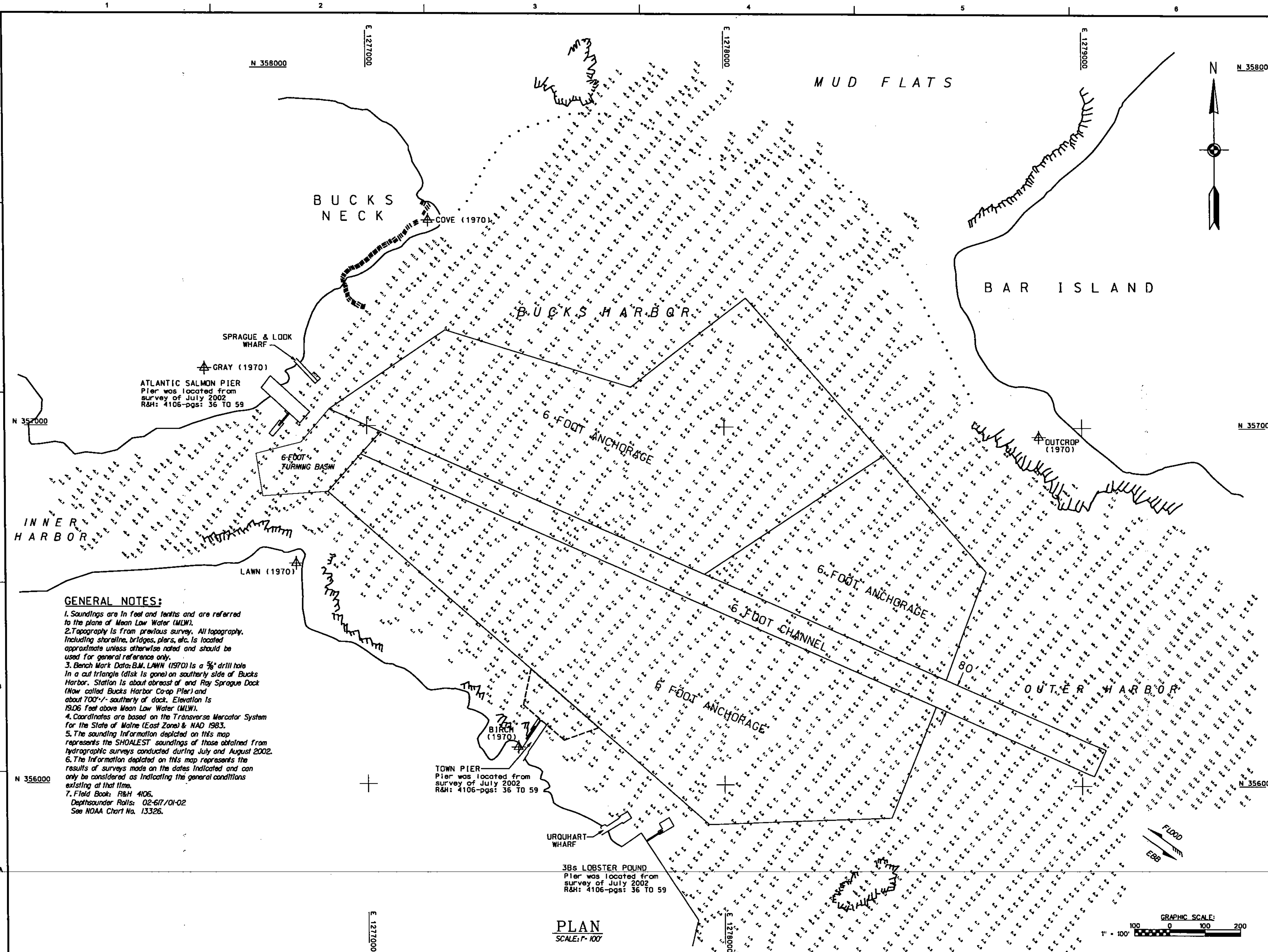
US Army Corps of Engineers® New England District

DESIGNED BY:	DATE:	REVISIONS NO.
DRAWN BY:	CHK'D BY:	DESCRIPTION
SUBMITTED BY:		CONTRACT NO.
PLOT SCALE: 1" = 100'	PLOT DATE: 24 Nov 2003	DRAWING NO.
FILE NAME:		

U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
CONCORD, MASSACHUSETTS

MAINTENANCE AND IMPROVEMENT DREDGING
BUCKS HARBOR
MACHIASPORT, MAINE
ALTERNATIVE 3A

SHEET IDENTIFICATION
X-001
SHEET X OF Y



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PLAN
SCALE: 1" = 100'

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U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
CONCORD, MASSACHUSETTS

DESIGNED BY:		DATE:	
DWN BY:	CKD BY:	SOLICITATION NO.:	
SUBMITTED BY:		CONTRACT NO.:	
PLOT SCALE: 1" = 100'	PLOT DATE: 20 Nov 2007	DRAWING CODE:	
SIZE: ANSI F	FILE NAME: bucC101.a04		

MARK	DESCRIPTION	DATE	APPR.	MARK	DESCRIPTION	DATE	APPR.

MAINTENANCE AND IMPROVEMENT
DREDGING
BUCKS HARBOR
MACHIASPORT, MAINE

ALTERNATIVE 3B

SHEET IDENTIFICATION
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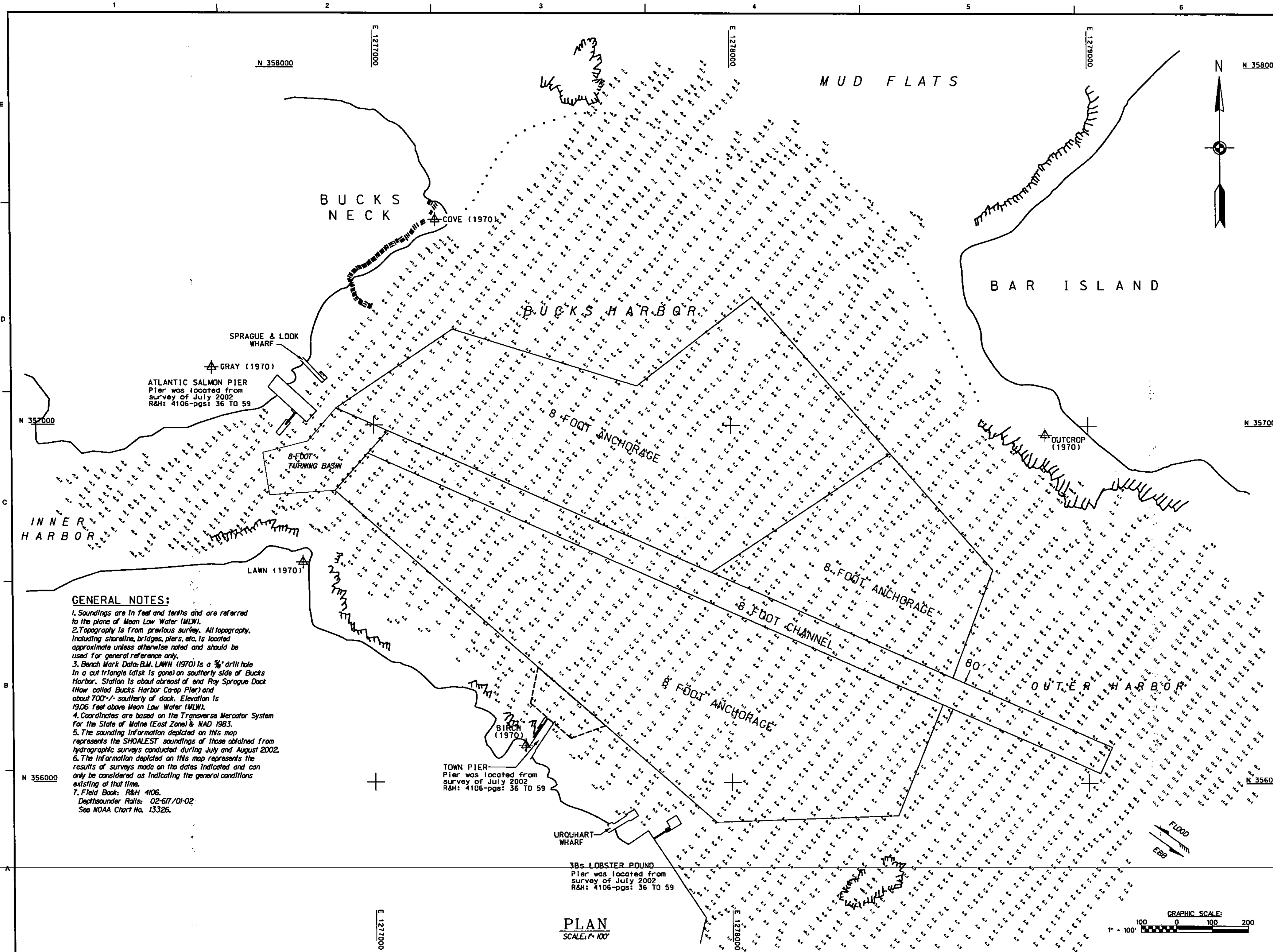
SHEET X OF Y



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US Army Corps of Engineers
New England District

MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
CONCORD, MASSACHUSETTS

DESIGNED BY:		DATE:
DWN BY:	CKD BY:	SOLICITATION NO.:
SUBMITTED BY:		CONTRACT NO.:
PLOT SCALE: 1" = 100'	PLOT DATE: 20 Nov 2007	DRAWING CODE:
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MAINTENANCE AND IMPROVEMENT
DREDGING
BUCKS HARBOR
MACHIASPORT, MAINE

ALTERNATIVE 3C

SHEET IDENTIFICATION
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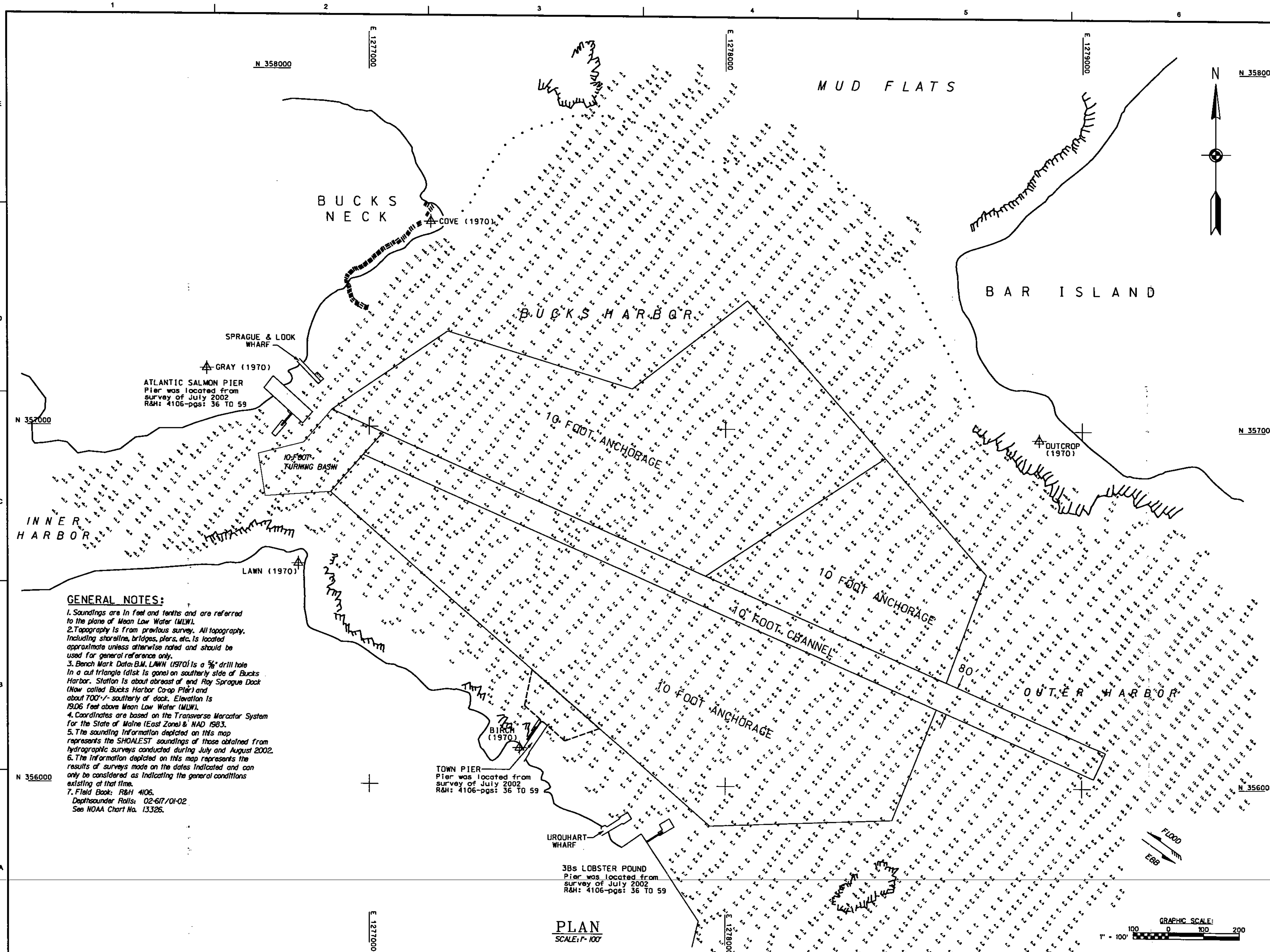

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PLAN
SCALE: 1" = 100'

US Army Corps of Engineers
New England District

U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
CONCORD, MASSACHUSETTS

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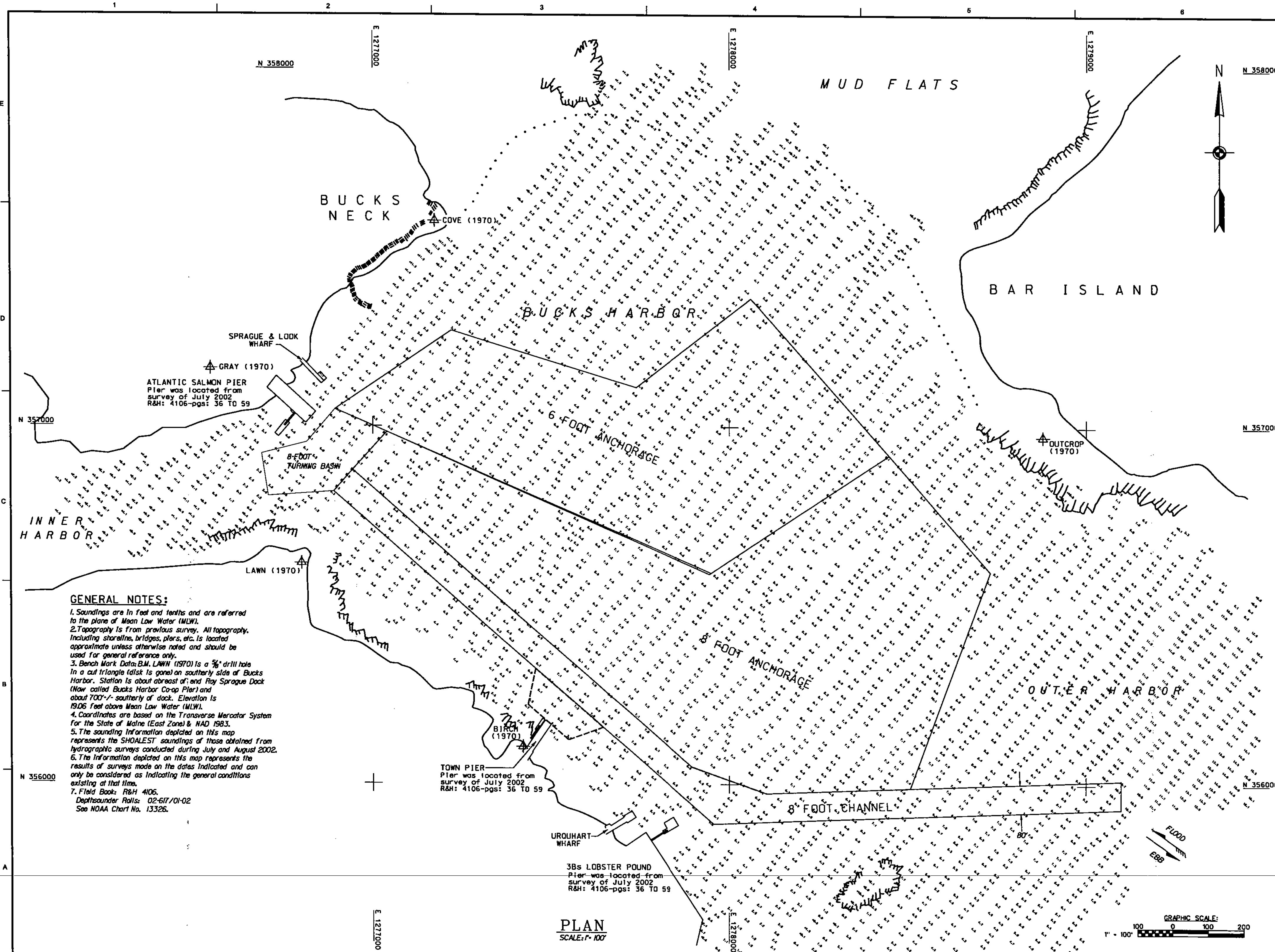
MAINTENANCE AND IMPROVEMENT
DREDGING
BUCKS HARBOR
MACHIASPORT, MAINE
ALTERNATIVE 3D

SHEET IDENTIFICATION
X-001
SHEET X OF Y



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1. Soundings are in feet and tenths and are referred to the plane of Mean Low Water (MLW).
2. Topography is from previous survey. All topography, including shoreline, bridges, piers, etc. is located approximate unless otherwise noted and should be used for general reference only.
3. Bench Mark Data: B.M. LAWN (1970) is a 5/8" drill hole in a cut triangle (disk is gone) on southerly side of Bucks Harbor. Station is about abreast of end Roy Sprague Dock (Now called Bucks Harbor Co-op Pier) and about 700'+/- southerly of dock. Elevation is 19.06 feet above Mean Low Water (MLW).
4. Coordinates are based on the Transverse Mercator System for the State of Maine (East Zone) & NAD 1983.
5. The sounding information depicted on this map represents the SHOALEST soundings of those obtained from hydrographic surveys conducted during July and August 2002.
6. The information depicted on this map represents the results of surveys made on the dates indicated and can only be considered as indicating the general conditions existing at that time.
7. Field Book: R&H 4106.
   Depthsounder Rolls: 02-617/01-02
   See NOAA Chart No. 13326.

US Army Corps of Engineers
New England District

U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
CONCORD, MASSACHUSETTS

MAINTENANCE AND IMPROVEMENT
DREDGING
BUCKS HARBOR
MACHIASPORT, MAINE

ALTERNATIVE 3E

SHEET IDENTIFICATION
X-001
SHEET X OF Y